The Target Generation Facility (TGF)

Data Reduction and Analysis Toolkit

DRAT

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The TGF Data Reduction & Analysis Toolkit

User's Manual

Created by the Target Generation Facility, located at

http://www.faa.gov/go/tgf/

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1 Overview

The TGF Data Reduction and Analysis Toolkit (DRAT) was developed to generate reports on air traffic control simulations for data analysis. Researchers can use this tool to analyze and interpret various sets of dependent variables that relate to both air traffic system performance and individual controller performance. Analysts will be able to evaluate the output of the tool with statistical packages without manual elimination of extraneous raw data.

Analysts without any prerequisite programming skills can quickly learn how to use the tool. The menu-driven Graphical User Interface (GUI) allows easy customization of data output and tailoring of data reports to meet the research analysis requirements of the studies being conducted. The tool's menu-driven interface allows the selection of TGF simulation recordings. The analyst can select data from sets of variables for output, process summary statistics based on user-specifiable time blocks, and print the output generated to the desired format. The output can be printed to either a text format for reading or to a comma-delimited format compatible with spreadsheet import files such as those used by MS-Excel, Lotus 1-2-3, or Quattro Pro. Frequently used data output formats can be saved and are accessible through menus.

Among the types of reports the DRAT is capable of producing are system complexity measurement reports, system activity/load measurement reports, conflict reports on aircraft violation of separation requirements, aircraft characteristic reports, and navigational information reports. Frequencies and duration of events can be determined over the length of the simulation or over specifiable intervals of time. The reports can be adapted to meet the analysts' needs and, as such, are highly customizable.

The following documentation includes a user's manual that includes illustrations of the GUI panels, descriptions of the data filters, and a glossary of FAA simulation research terms.

2 Introduction and Basic Concept

The DRAT toolkit is a modular, highly adaptable application for extracting data from TGF simulations for the benefit of the customers' analysts. Since the TGF simulator records exhaustive detail on the state of the simulation, customers that look at the simulator data want to quickly reduce the amount of information to the set of details that is pertinent to their particular study. The DRAT toolkit provides tools to select on a wide variety of data elements to construct a subset of the simulator data that can be analyzed easily. DRAT can also produce summary information about a simulation. This is all packaged with an easily operated Graphical User Interface (GUI) interface.

The following definitions are commonly used terms for the DRAT application:

- Configuration – a sequence of DRAT tools that operates on TGF simulator data to generate (at least) one set of output. (Some types of configurations can produce multiple output files containing different sets of output.) Each DRAT tool in the sequence operates on the simulator data resulting from the previous tool in the sequence. A minimum of two tools is needed to produce output (a reader and either a writer or plotter).
- Data Object – is a set of related information such as aircraft information, fix information, or pilot (pseudo-pilot) command information. In effect, a data object can be thought of as a record with multiple fields.
- Recording File – is a file containing "data objects" detailing the initialization parameters of a TGF simulation, second-by-second information on the state of the simulation, and messages describing events that occurred during the simulation.
- Reader – allows the selection of an input file to translate data into "data objects" that the other DRAT tools can operate on.
- Filter – allows the selection of a subset of "data objects" by removing objects not containing a specified characteristic that the filter was designed to select for.
- Factory – combines information from existing "data objects" to create new sets of information encapsulated in new data objects.
- Writer – allows the selection of an output file in a specific format. Each writer generates a report to an output file, which can be read by an editor or sent to a writer.

DRAT operates by taking a configuration of the DRAT tools, and subjecting the TGF simulator data to each tool's process in sequence. The Reader tools construct data objects by importing data from a file; subsequently, the other tools select from the data received, construct new data objects, or generate output for the user. Each tool operates on all the data objects it receives according to its function and then sends the resulting data objects to the next tool. The DRAT GUI displays the configuration in a top-to-bottom sequence that should, at minimum, start with a reader and end with a writer or plotter. Configurations can be constructed by the user and, if desired, saved for future reuse.

3 Parts of the DRAT GUI

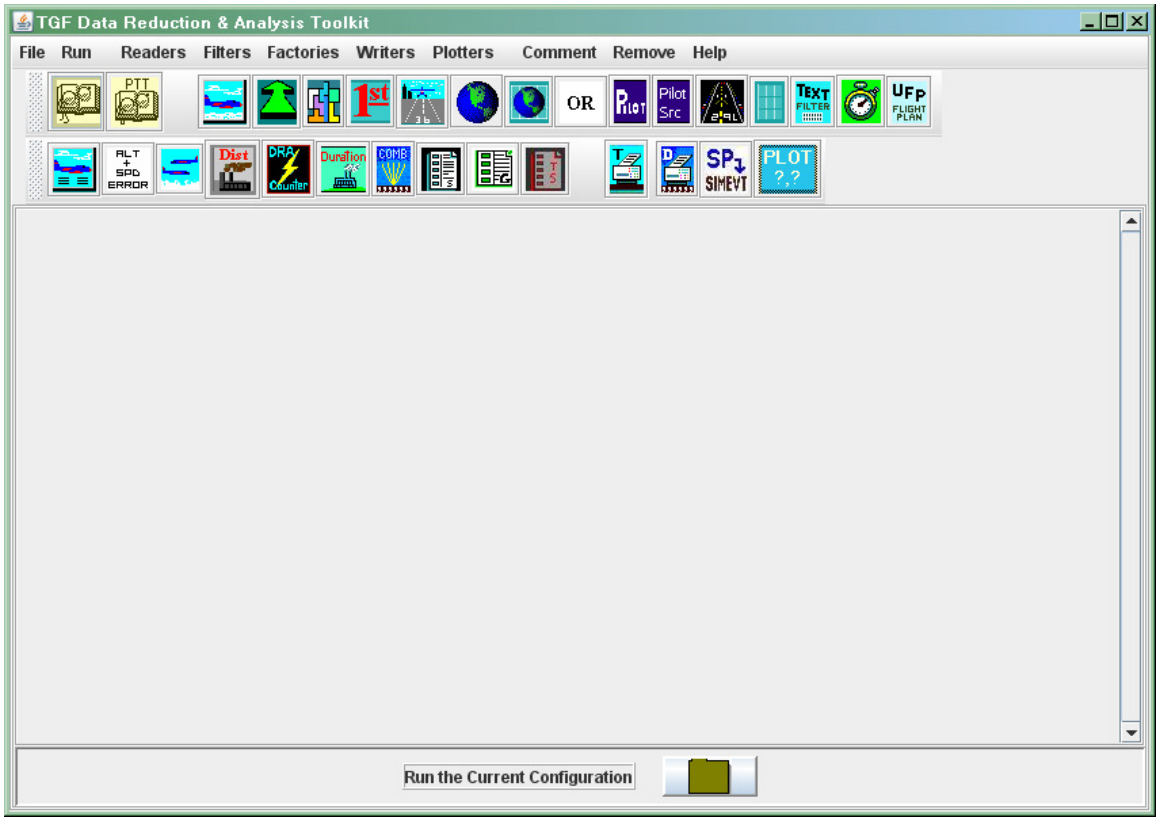


Figure 1

Welcome to the TGF Data Reduction and Analysis Toolkit GUI. The DRAT GUI will provide assistance in the extraction and formatting of simulation data, for use in the analysis of simulation results.

The DRAT GUI has several main sections: the menu bar, from which all operations can be performed, the toolbar, which provides fast access to the frequently used DRAT tools (for placement on the tool configuration workspace below), and the tool configuration workspace, where the selected tools are displayed, allowing the individual tools to be configured.

3.1 The Menu Bar

Figure 2

The menu bar is the access point for the actions and tools to be used when operating the DRAT GUI. Selecting a tool on one of the menus will cause the tool to be placed after any previously selected tools in the list displayed on the tool configuration workspace. (Individual menus are described Section 4 The Menus.)

3.2 The Toolbar

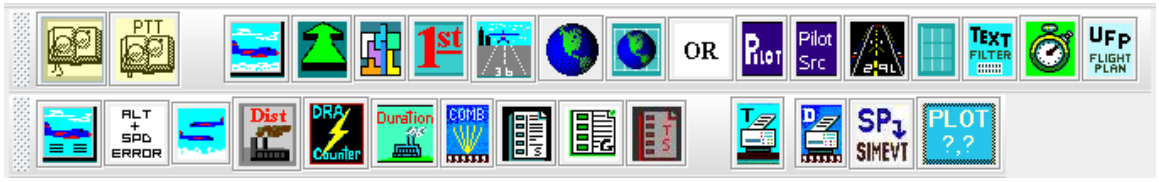


Figure 3

The toolbar provides quick access to a subset of the DRAT tools. The icons represent the DRAT tools that are the most often used. Selecting any of these icons causes the same result as selecting the corresponding tool from the dropdown menu bar.

3.3 The Tool Configuration Workspace

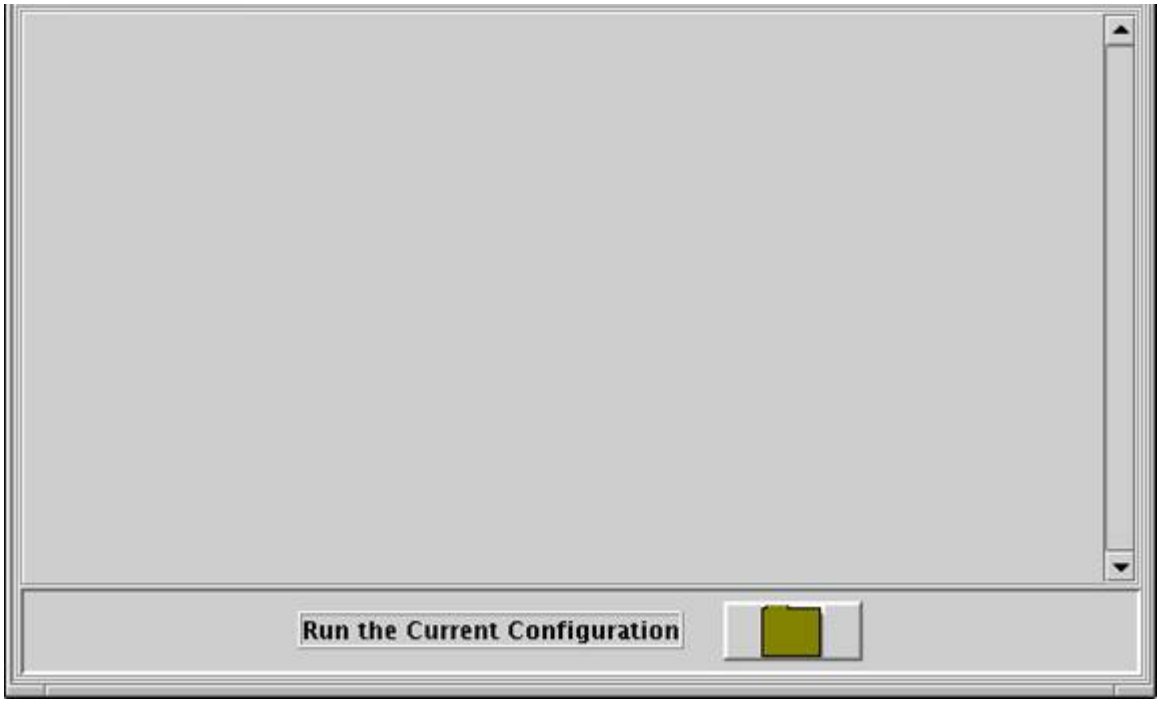


Figure 4

The tool configuration workspace is where the selected sequence of DRAT tools is displayed and constructed to create the desired data reduction output. The layout of the tool configuration panels, from top to bottom, is the order in which each tool acts upon the Data Objects received from the previous tool.

The panels for the DRAT tools can be added by choosing a menu selection or by selecting a button on the quick-access toolbar. They can be removed by selecting a Remove menu option or by right-clicking on the panel title and selecting “Delete”.

The order of the DRAT tools can be modified by left-clicking on the panel and while holding the left mouse button down dragging the mouse to where to place the tool. The tool that will move is surrounded by a yellow border. As the mouse is moved a black line appears to show where the tool will be placed if the left mouse button is released.

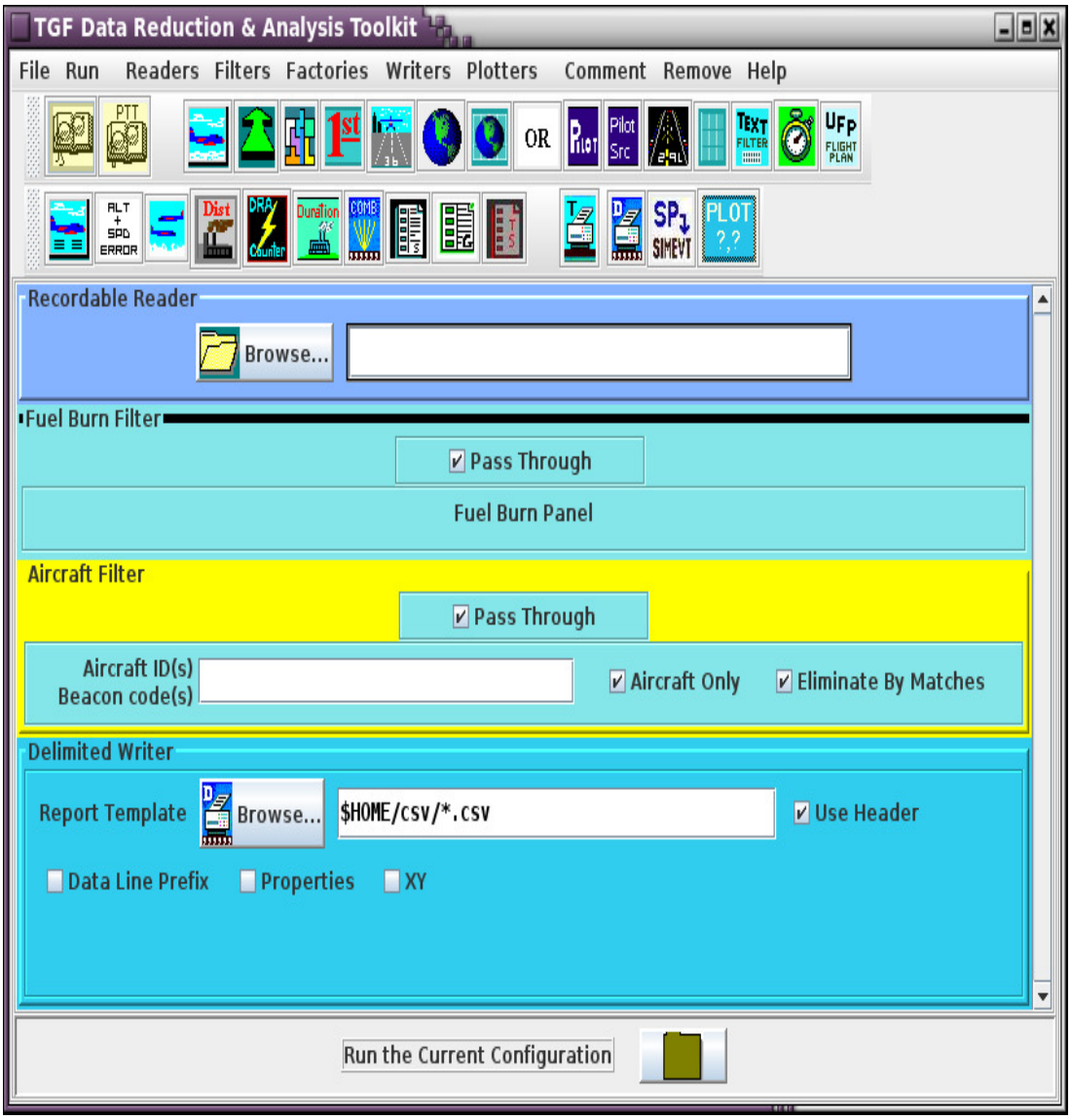

TGF Data Reduction & Analysis Toolkit
File Run Readers Filters Factories Writers Plotters Comment Remove Help
Recordable Reader
Browse...
Fuel Burn Filter
Pass Through
Fuel Burn Panel
Aircraft Filter
Pass Through
Aircraft ID(s)
Beacon code(s)
Aircraft Only
Eliminate By Matches
Delimited Writer
Report Template
Browse...
$HOME/csv/*.csv
Use Header
Data Line Prefix
Properties
XY
Run the Current Configuration

Figure 5

3.4 Message Window

The Message Window Displays messages generated during processing. There are four types of messages:

- Debug – Contain debugging information and can be disabled if desired. Typically appears in black.
- Info – Contain information. Typically appears in green.
- Warning – Contain warnings. Typically appears in yellow.
- Error – Contain errors. Typically appears in red.

Messages can be turned on and off dynamically using the View menu. For more information on using the Message Window please see the "TGF User's Manuals (ECO)" at http://www.faa.gov/go/tgf/.

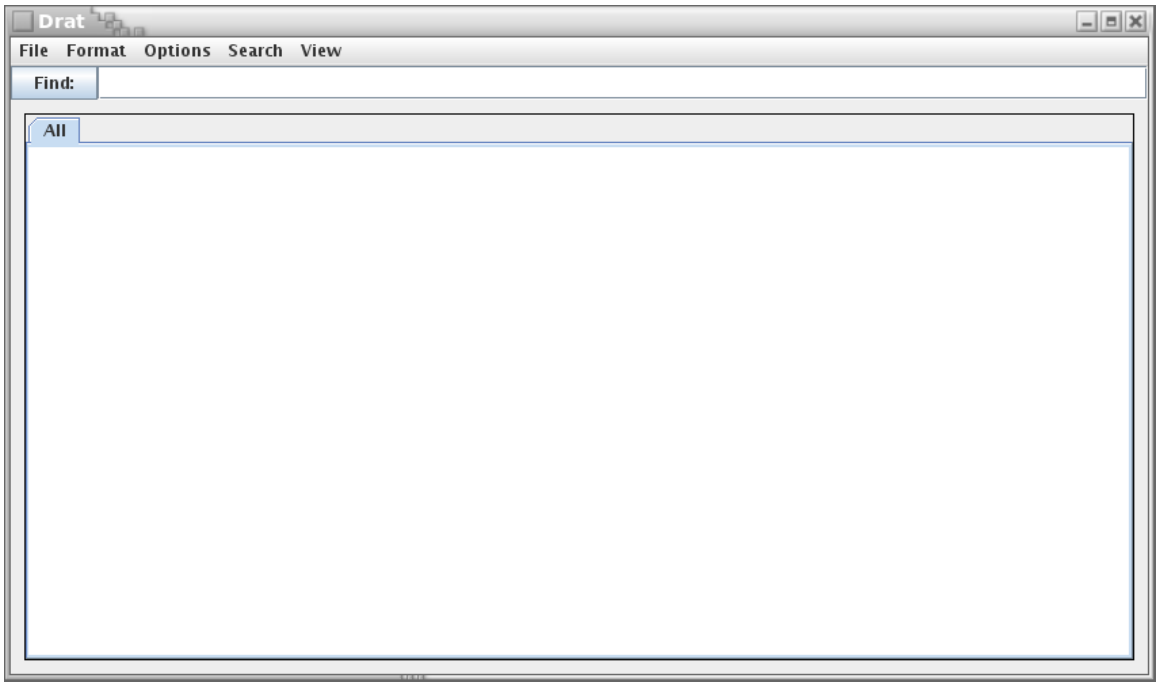


Figure 6

4 The Menus

This section contains information on DRAT's various menus.

4.1 File

Figure 7

When File is pressed, the File Menu pops down. The user is presented with choices on the data reduction and analysis setup. The user can clear the tool configuration workspace, open a previously saved configuration and display it on the workspace, save the current configuration, or exit the DRAT GUI. The "Open Recent" menu option will present the user a list of recently used configurations. The user may choose which one configuration to load. The user may also open and display the plotted coordinates of an XML file in the Berkeley Ptolemy II plot format (see http://ptolemy.eecs.berkeley.edu/java/ptplot), which can be generated by a DRAT tool.

4.2 Run

Figure 8

The Run Menu allows the user to run the current configuration. The user can either run the current configuration from this location or click the shortcut folder icon (shown below) that appears at the bottom of the tool configuration workspace.

Figure 9

4.3 Readers

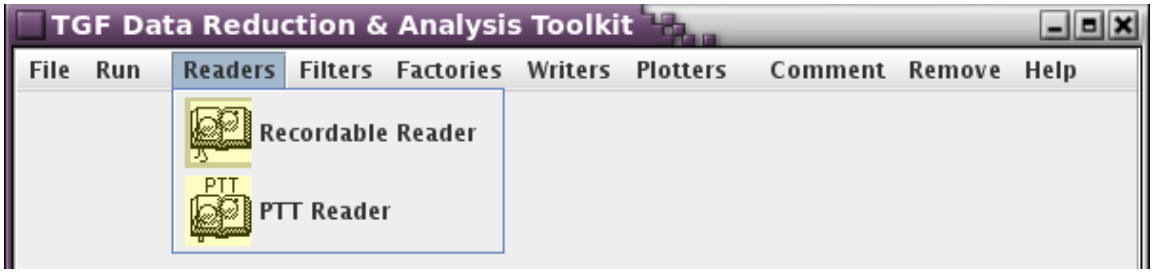


Figure 10

Readers provide the ability to select an input file in an encoded format. The Recordable Reader chooses a TGF recording file as a data source. When the configuration is run, the reader will read the file's information and translate it into Data Objects. The data objects generated are sent on to the next tool in the sequence.

Selecting a tool from the Reader menu opens a reader panel inside the GUI workspace.

Recordable Reader – the standard reader: reads a TGF recording file containing simulation data (For detailed description: see 5.1.1)

PTT Reader – a reader that reads a PTT recording file containing Push to Talk data (For detailed description: see 5.1.2)

4.4 Filters

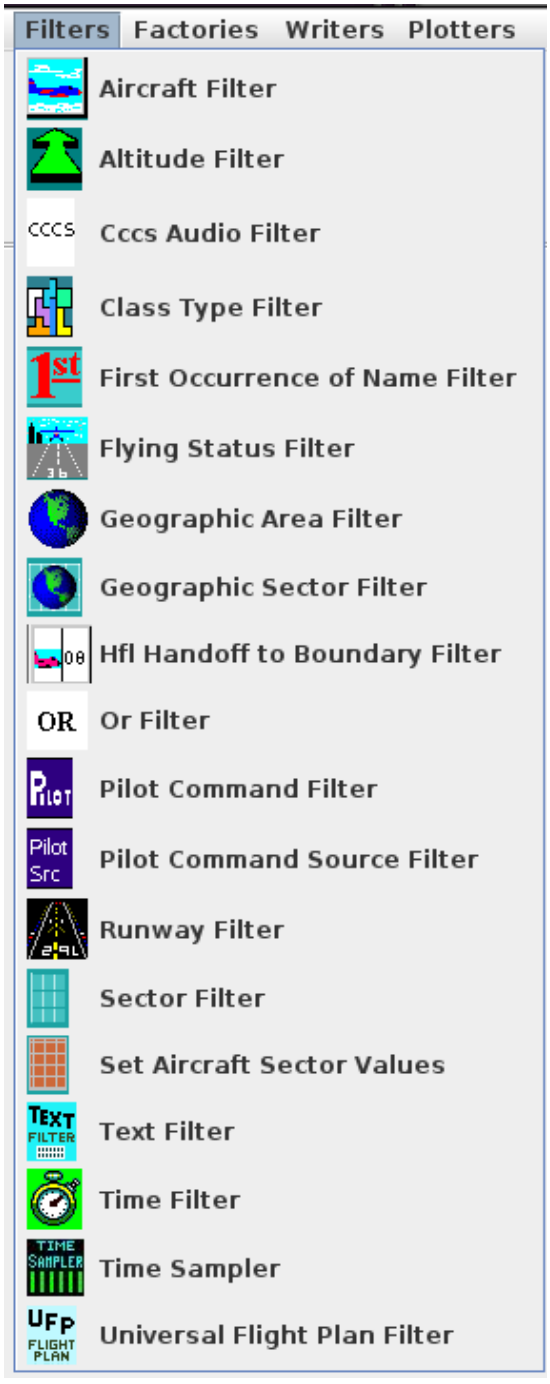


Figure 11

The Filters Menu gives the user all of the filter names and their corresponding icons. These filter icons indicate panels that allow selection of a subset of data.


Aircraft Filter – filters on any data object having an associated aircraft (including second-by-second aircraft state data) by either aircraft ID or beacon code. (For detailed description: see 5.2.1)


Altitude Filter – filters Data Objects with an altitude by the altitude range specified. (For detailed description: see 5.2.2)

CCCS Audio Filter – filters audio events for CCCS information. (For detailed description: see 5.2.3)


Class Type Filter – filters for a specified type of Data Object. (For detailed description: see 5.2.4)


First Occurrence of Name Filter – sends only the first instance of data objects with the same name (prevents state updates). (For detailed description: see 5.2.5)


Flying Status Filter – filters second-by-second information for aircraft by their current flying status. (For detailed description: see 5.2.6)


Geographic Area Filter – filters data objects with a location by a set of geographic boundary coordinates. (For detailed description: see 5.2.7)


Geographical Sector Filter – filters data objects with location by the geographic coordinates of the named sectors. (For detailed description: see 5.2.8)


HFL Handoff to Boundary Filter – filters data for aircraft when the handoff is accepted to until it crossed the sector boundary. (For detailed description: see 5.2.9)

OR Filter – takes two or more tools and sends data that was sent from any of the filters or factories. (For detailed description: see 5.2.10)

Pilot Command Filter – filters pilot commands by their defined type. (For detailed description: see 5.2.11)

Pilot Command Source – filters pilot commands by their source. (For detailed description: see 5.2.12)


Runway Filter – filters by a set of specified runways for data objects with associated runways. (For detailed description: see 5.2.13)


Sector Filter – filters by a set of specified sectors for data objects with associated sectors. (For detailed description: see 5.2.14)


Set Aircraft Sector Values – filters by a set of specified sectors. (For detailed description: see 5.2.15)

Text Filter – filters on text output that would be generated by the DRAT Text Writer. (For detailed description: see 5.2.16)


Time Filter – filters time stamped data objects by a time interval. (For detailed description: see 5.2.17)

Time Sampler – samples time-stamped data objects by sending only objects that occur at a multiple of a time interval. (For detailed description: see 5.2.18)

Universal Flight Plan Filter – filters on aircraft-related information of aircraft having a UFP field match. (For detailed description: see 5.2.19)

4.5 Factories

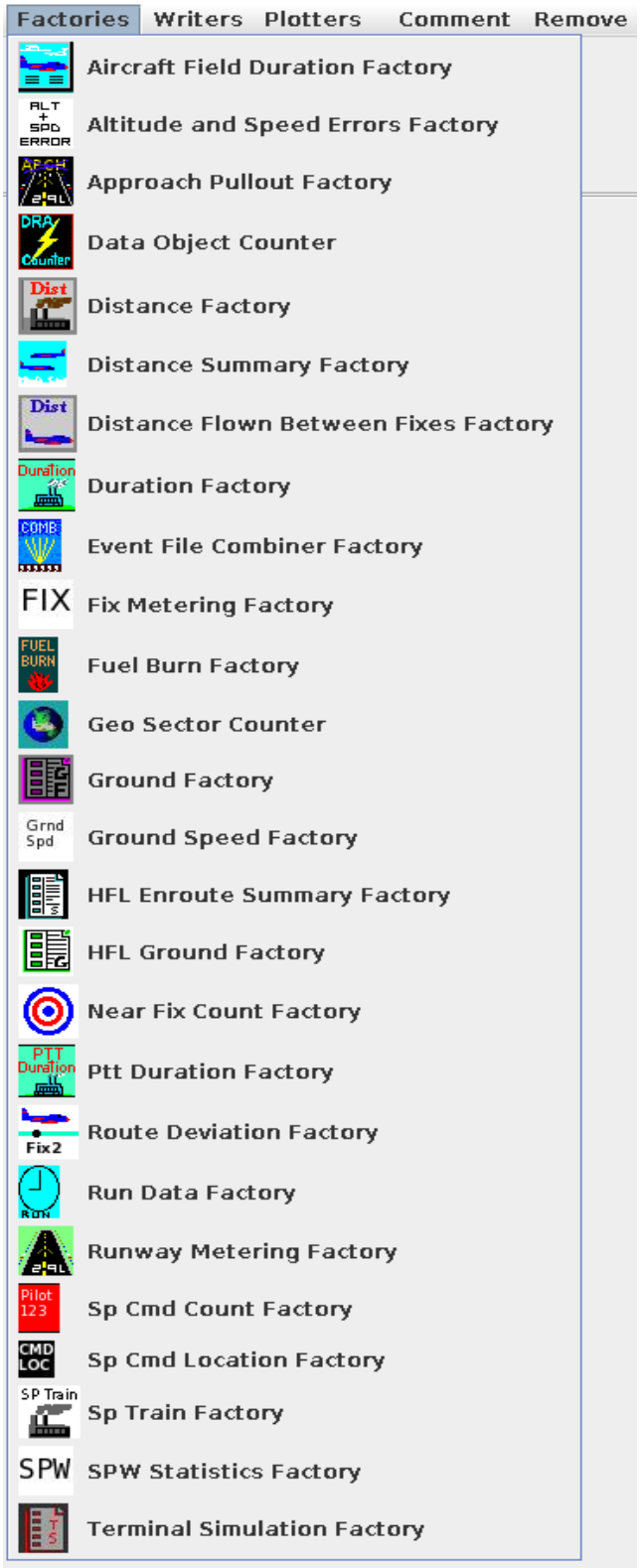


Figure 12

The Factories Menu opens to reveal a selection of factories, or object generators. Generally, a factory is used to provide calculated data or summary information, so the analyst does not need to perform the calculations manually.

Aircraft Field Duration Factory – creates durations based on some values of selected aircraft state data. (For detailed description: see 5.3.1)

Altitude and Speed Error Factory – calculates the difference between an Aircraft's desired altitude/speed and its current altitude/speed. (For detailed description: see 5.3.2)

Approach Pullout Factory – generates information about when aircraft on approach have been pulled off approach. (For detailed description: see 5.3.3)

Data Object Count Factory – generates totals and interval subtotals of data objects received. (For detailed description: see 5.3.4)

Distance Factory – generates specific distance information for aircraft. (For detailed description: see 5.3.5)

Distance Summary Factory – generates detailed information about separation violations. (For detailed description: see 5.3.6)

Distance Flown Between Fixes Factory – generates information about the distance flown by aircraft between a given set of fixes. (For detailed description: see 5.3.7)

Duration Factory – generates duration reports on time-stamped data received. (For detailed description: see 5.3.8)

Event File Combiner Factory – combines the delimited output of combinable event types onto one comma-delimited output file. (For detailed description: see 5.3.9)

Fix Metering Factory – generates information about the metering of aircraft over a given fix. (For detailed description: see 5.3.10)

Fuel Burn Factory – creates a fuel burn data file. (For detailed description: see 5.3.11)

Geo Sector Counter Factory – Generates information about the number of aircraft in a GEO Sector over the course of a given interval. (For detailed description: see 5.3.12)

Ground Factory – generates information relating to a ground simulation. (For detailed description: see 5.3.13)

Ground Speed Factory – generates detailed information about an Aircraft's ground track speed. (For detailed description: see 5.3.14)

HFL EnRoute Summary Factory – generates summary information relating to an EnRoute simulation. (For detailed description: see 5.3.15)

HFL Ground Factory – generates information relating to a ground simulation. (For detailed description: see 5.3.16)

Near Fix Count Factory – generates detailed information about when Aircraft passes over a given route node or near a given fix. (For detailed description: see 5.3.17)

PTT Duration Factory – generates duration reports for PTT data received. (For detailed description: see 5.3.18)

Route Deviation Factory – generates information about how far an aircraft deviated from a given route. (For detailed description: see 5.3.19)

Run Data Factory – generates detailed information about how long a simulation was run. (For detailed description: see 5.3.20)

Runway Metering Factory – generates detailed information about metering averages for arriving aircraft. (For detailed description: see 5.3.21)

Sp Cmd Count Factory – generates detailed information about SimPilot Command and their source. (For detailed description: see 5.3.22)

Sp Cmd Location Factory – generates detailed information about where an Aircraft was when it received a command. (For detailed description: see 5.3.23).

Sp Train Factory – generates information about a SimPilot Training running. (For detailed description: see 5.3.24)

SPW Statistics Factory – generates information about SimPilot Workstations (SPW). (For detailed description: see 5.3.25)

Terminal Simulation Factory – generates summary information relating to a terminal simulation. (For detailed description: see 5.3.26)

4.6 Writers

Figure 13

Writers allow the selection of an output file in a specific format. Each writer generates a report to an output file that can be read by an editor, or sent to a writer. When the Writers Menu is selected, the file writer tools are listed for selection. The most used writers are the Text Writer, which produces easily readable text output for the objects received and the Delimited Writer, which writes the data to comma-separated format.

Text Writer – saves output to easily readable text format. (For detailed description: see 5.4.1)

Delimited Writer – saves output of pre-configured data objects to comma-delimited format. (For detailed description: see 5.4.2)

Flight Plan Writer – recreates the flight plan of the current TGF recording. (For detailed description: see 5.4.3)

Sim Event Writer – converts SP commands to SimEvents (automated command entries) and writes them to XML format (.evt). (For detailed description: see 5.4.4)

Plot Generator XML Writer – writes an XML file with plotted comparison of one data object field to another (similar to XY Plotter). (For detailed description: see 5.4.5)

Sectorizing Writer – separates info by sector, writing to files named with the sector name. (For detailed description: see 5.4.6)

Sp Assign File Writer – writes XML SP assign file. (For detailed description: see 5.4.7)

Aircraft 4D Position Writer – writes four-dimensional position data to a file. (For detailed description: see 5.4.8)

KML Writer – writes aircraft position data to a KML file. (For detailed description: see 5.4.9)

4.7 Plotters

Figure 14

XY Plotter – plots comparison of one data object field to another (similar to Plot Generator XML Writer. (For detailed description: see 5.5.1)

4.8 Comment

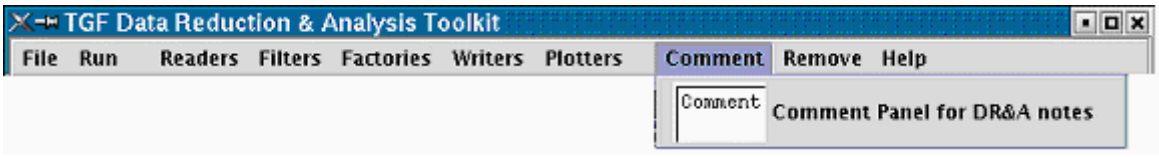


Figure 15

Provides a text area in which to store notes on the DRAT configuration.

Figure 16

4.9 Remove

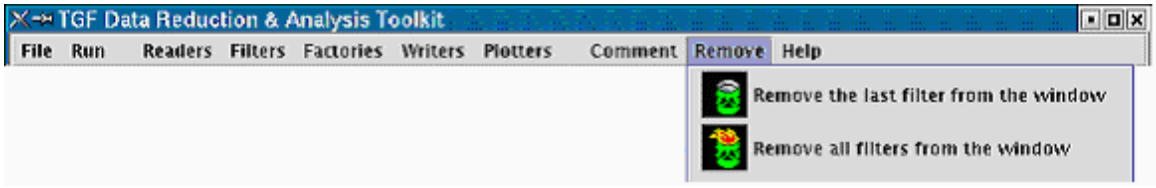


Figure 17

The Remove menu has two options.

Remove the last – allows the user to remove the last filter from the Tool Configuration Workspace.

Remove all – removes all the filters that are open in the Tool Configuration Workspace.

4.10 Help

Figure 18

When the user selects the Help Menu, options are displayed to open the DRAT user's manual (in HTML format) in a new window. The first help option displays the user's manual in a barebones HTML viewer. The "Select Browser" option allows the DRAT user's manual to be displayed by a user-selected browser or HTML editor--a file chooser allows the user to specify the executable to use, and the URL for the user's manual is used as a parameter to the executable file. The "About" option displays information about the jar file (if any) used to run the DRAT.


About Drat
The Future of Aviation Begins Here
Original Jar Name:
tgf2011-02-18-T0829.jar
SVN Revision:
30132
Development Status:
Drat jar
Description:
latest version of Drat
SVN Branch:
svn+ssh://svn.tgf.tc.faa.gov/sw/svn/tgf/trunk
Aircraft Baseline:
Unknown
Recent Changes:
Advanced Simulation Technology Developed By:
Federal Aviation Administration
William J. Hughes Technical Center
Integrated Engineering Services
Simulation (AJP-786)
Target Generation Facility
Contact: Dan.Warburton@faa.gov
DEPARTMENT OF TRANSPORTATION
UNITED STATES OF AMERICA
FEDERAL AVIATION ADMINISTRATION
OK

Figure 19

5 The Tools

The DRAT tools can be arranged together to create data reduction and analysis output; they generate output using a modular, sequence-dependent configuration structure. The first tool in a configuration must be a reader so that the following tools have data objects to operate on. The reader tools construct data objects by importing data from a file; the other tools select from the data received, construct new data objects, or generate output for the user. Each tool operates on the set of data objects it receives according to its function and then sends the resulting data objects to the next tool in the top-to-bottom sequence. (See Section 2 Introduction and Basic Concept for a more detailed description.)

5.1 The Readers

A reader constructs data objects from information in an input file. The first tool on the DRAT configuration panel should always be a reader, since the readers are the only DRAT tools that do not need to receive data objects from other tools.

5.1.1 Recordable Reader

The only current stand alone reader tool is the Recordable Reader. The Recordable Reader provides the ability to select a TGF recording file to generate data objects from. The output generated consists of all the data objects as they were recorded to TGF format. See Section 6 The DR&A Objects for a list of different types of data objects.

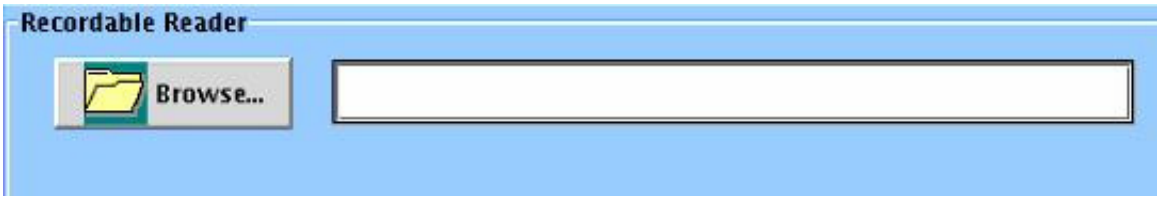
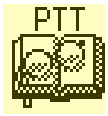


Figure 20

5.1.2 PTT Reader



The PTT Reader provides the ability to select a Push to Talk (PTT) recording file to correlate controller and pilot communications with other recorded data. A Recordable Reader must appear before this panel because the file may contain numerous days of PTT recordings, it is necessary to also use a TGF recording file to properly select the desired date. The output generated consists of PTT Data translated into data objects. See Section 6 The DR&A Objects for a list of different types of data objects. If the "Filter Audio (CCCS)" is checked, then only valid PTT data associated with the CCCS channels found in the recording are passed through. If the "Filter Audio (CCCS)" is not checked, then all valid PTT data is passed through.

Note: Must arrange with TGF to get PTT data recorded prior to simulation to have it available for analysis.

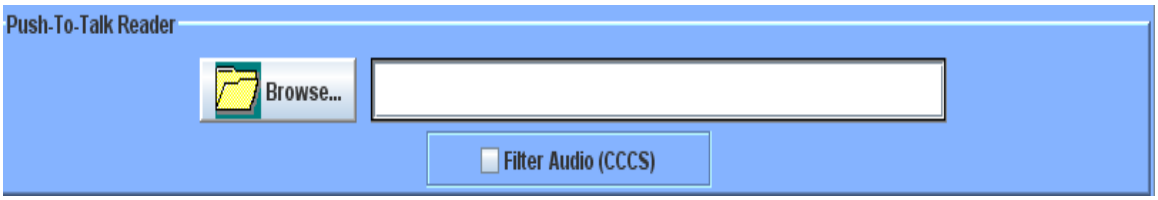


Figure 21

5.2 The Filters

Filters provide the means to select a subset of received data objects, deciding which are to be sent to the next tool based on the information contained within the data objects. The filters operate by eliminating data objects that do not meet certain constraints and sending the rest of the data objects to the next tool. Several filters can be used in sequence to select for several categories of criteria.

Most filters have a "Pass Through" selection option. This field is an option if there is a question of whether to send objects that are not directly selected for by the filter criteria. For example, if a sector filter is told to select for sectors 17, 18, and 38, the filter will always eliminate data objects that contain a sector field that is not one of those 3 sectors. However, data objects that do not contain an associated sector field are not covered by this selection process; therefore, checking the pass through field would cause data objects that do not have sector fields to be sent on.

5.2.1 Aircraft Filter

The Aircraft Filter panel filters data objects with an associated aircraft (including second-by-second aircraft state objects). The user can choose to refer to an Aircraft by either its aircraft ID (ACID) or its beacon code. Only objects that are associated with an aircraft matching these criteria will be passed through the filter. If the aircraft ID/beacon code parameter field is left blank, all aircraft associated objects are sent. Selecting "Pass Through" will allow objects without an associated aircraft to pass through the filter. If "Eliminate By Matches" box is then any object matching the specified search string is filtered out. If the "Aircraft Only" box is checked then only the second by second aircraft state objects that meet the specified criteria are passed through. Otherwise, any object with an associated aircraft that meets the specified criteria is passed through

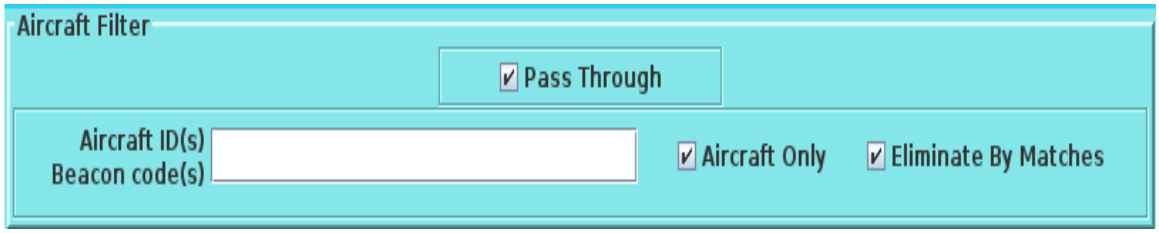


Figure 22

5.2.2 Altitude Filter

The Altitude Filter operates on data objects that have an associated altitude; for example, the Aircraft State object, which represents the second-by-second state of an aircraft, has an altitude as part of its position information. The user can specify the minimum and maximum altitude limits of objects the filter will allow through. Selecting Pass Through allows data objects that do not have an associated altitude to pass through the filter.

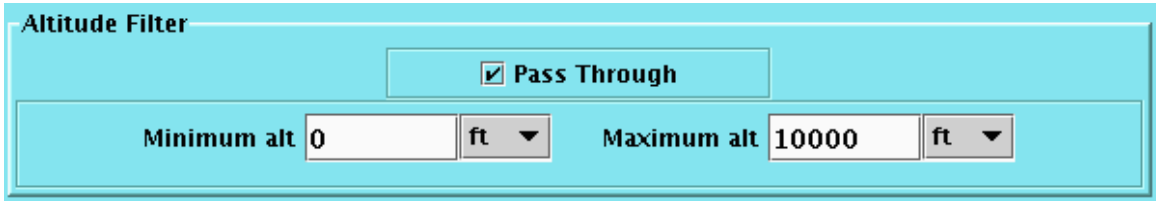


Figure 23

5.2.3 CCCS Audio Filter

The CCCS Audio Filter filters on objects based on CCCS Audio Events. If "Pass Through" option is not selected then only CCCS Audio events and simulation start, pause, and termination data is sent through.

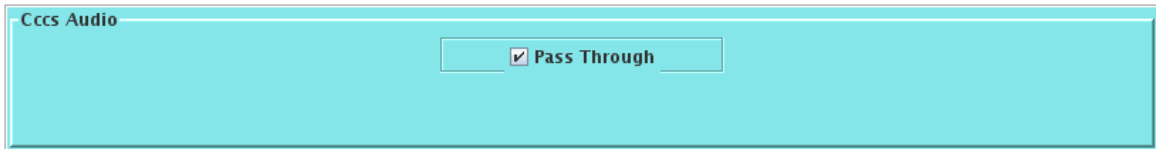


Figure 24

5.2.4 Class Type Filter

The Class Type Filter provides a generic filter that selects a data object by type. Section 6 The DR&A Objects lists the data object types. This filter is used to specify the selection or elimination of a single type of data. If the "Remove class" option is checked, then the selected object will be filtered out. Otherwise, only the selected object, Sim Termination, and End of Epoch events are passed on.

Figure 25

5.2.5 First Occurrence of Name Filter

The First Occurrence of Name Filter looks for objects that have a defined name fields and only sends through the first occurrence of a specific name for an object type. For example, by selecting a configuration sequence of:

- Recordable Reader (specifying input file)
- Aircraft Filter (blank to indicate all aircraft; Pass Through off)
- First Occurrence of Name Filter
- Text Writer (specifying output file)

The result would be the aircraft state information for each aircraft's starting second (aircraft do not have state information until they are activated), written to text format output. Objects that do not have a unique name will pass through this filter.

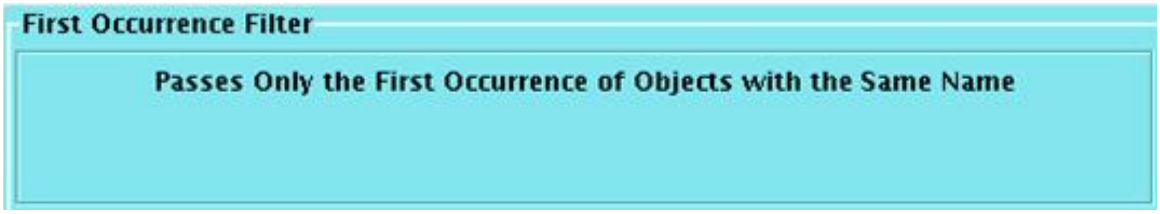


Figure 26

5.2.6 Flying Status Filter

The Flying Status Filter filters objects based on the phase of flying or the rules of flying the aircraft is operating under.

The specific, exclusive flying states are:

- Gate Hold – held at gate
- Departing – departing, an airport but not yet at maneuver altitude.
- Join Route – an aircraft is attempting to join with a route
- On Route – EnRoute aircraft initial state; aircraft is following its flight plan or returning to its flight plan.
- On Vectors – aircraft is not on route, and not meeting another state.
- Hold – aircraft is in a holding pattern.
- ILS Before Final – on ILS approach and on the localizer, but not yet on final approach.
- Non-ILS Before Final – on Non-ILS approach and on the localizer, but not yet on final approach.
- ILS Final – on ILS final approach.
- Non-ILS Final – on Non-ILS final approach.
- Past Threshold – the aircraft has passed the runway threshold and is landing
- Missed Approach – aborting approach
- Landed – touched down on arrival runway
- Terminated – the aircraft is no longer active in the simulation

- Cockpit Controlled – aircraft is under control of an external cockpit (this Status is no longer used).
- Dead Reckon – the aircraft is a dead reckoned import (not cockpit controlled).
- Preparing for Approach – the aircraft is preparing for approach
- Ground Taxi – an aircraft is taxiing about on the ground.
- Ground Hold – aircraft is in a hold on the ground.
- Takeoff Hold – an aircraft is on its departure runway in takeoff position, waiting for takeoff clearance.
- Takeoff Taxing – an aircraft is speeding up in order to take off from departure runway
- Cleared for Takeoff – an aircraft is cleared for takeoff and is starting to take off from its departure runway.
- Exiting Runway – an aircraft has just touched down & is braking before exiting runway
- At Gate – an aircraft has just reached its arrival gate.
- Collision Avoidance Hold – an aircraft on the ground is holding in order to avoid colliding with another aircraft on the ground
- Follow – an aircraft is following another aircraft.
- Group – an aircraft has joined a group of aircraft.
- Crashed – an aircraft has crashed into the ground or another object and is unresponsive.
- Alien Controlled – an aircraft is being transferred from an external source and is being updated via externally provided data. For more information on External Aircraft see Section 12.
- ILS Before Localizer – an aircraft is on an ILS approach and is not yet established on the localizer.
- Hover – an aircraft is performing a hover maneuver

Certain groups of flying states are also filterable with one Flying Status Filter:

- Flying – not in Gate Hold, On Ground, Landed, or Terminated state
- Not Flying – in Gate Hold, On Ground, Landed, or Terminated state
- On Ground – in Gate Hold, Takeoff Taxi, Landed, Ground Taxi, Ground Hold, Cleared for Takeoff, Takeoff Hold, Exit Runway, At Gate, or Collision Avoidance state
- Not On Ground – not in Gate Hold, Takeoff Taxi, Landed, Ground Taxi, Ground Hold, Cleared for Takeoff, Takeoff Hold, Exit Runway, At Gate, or Collision Avoidance state
- On Localizer – in ILS or non-ILS approach, on localizer – possibly on final
- Not On Localizer – not on Approach
- Hold Type – in Hold, Gate Hold, Ground Hold, Takeoff Hold, At Gate, or Collision Avoidance state
- Not Hold – not in Hold, Gate Hold, Ground Hold, Takeoff Hold, At Gate, or Collision Avoidance state
- ILS Type – in ILS approach state
- Not ILS Type – not in ILS approach state

- Landing Type – in Past Threshold, Prep for Approach, ILS/Non-ILS Before final, or ILS/Non-ILS Final state
- Not Landing – not in Past Threshold, Prep for Approach, ILS/Non-ILS Before final, or ILS/Non-ILS Final state
- Non-ILS Type – in Non-ILS approach state
- Approach Type – in either ILS or Non-ILS approach state
- All – all flying statuses

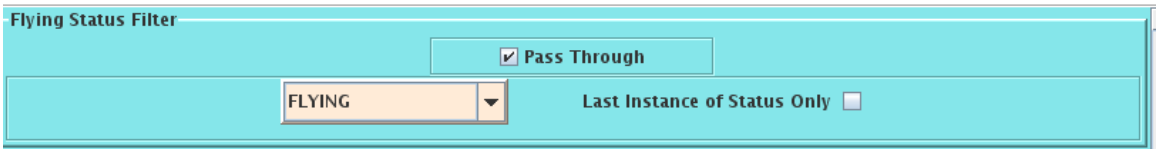


Figure 27

If you want to select a specific Flying status to filter for select "Use Type List" in the type combo box. This will bring up the type list combo box in which you can select multiple Flying Status to use when filtering.

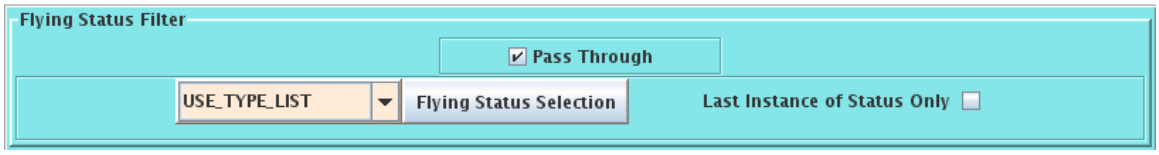


Figure 28 Use Type List Selected

"If the Last Instance of Status Only" box is selected then only the last time an Aircraft has a given status will be sent onward all other times will be filtered out.

5.2.7 Geographic Area Filter

The Geographic Area Filter filters on data objects with positions inside or outside a geographic location specified by a polygon. By default, all objects within the polygon are passed to the next tool. Selecting "Outside" passes data objects that lie outside the geographic boundaries instead. The geographic boundaries of the polygon can be specified with a series of either latitude and longitude positions or a stereographic projection and x- and y-coordinates. The last coordinate is automatically connected back to the first coordinate to complete the polygon. Selecting Pass Through will allow objects that do not have an associated position to pass through the filter.

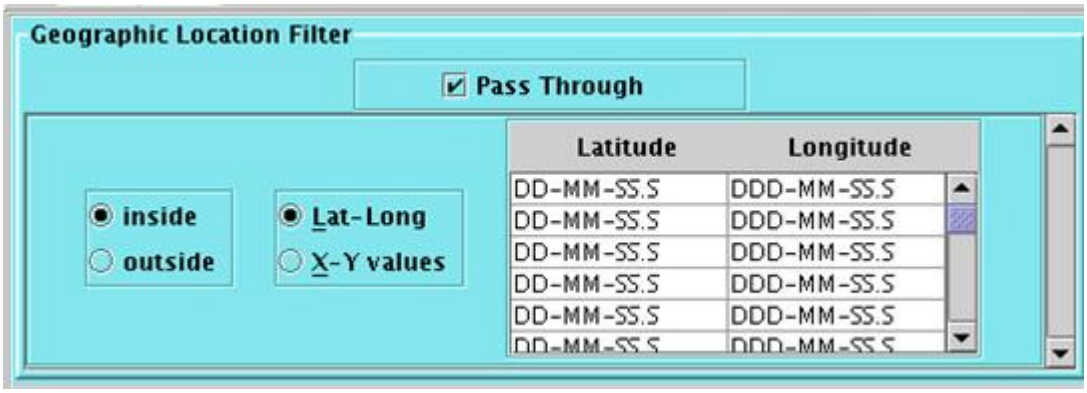
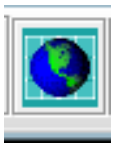


Figure 29

5.2.8 Geographical Sector Filter



The Geographical Sector Filter allows the filtering of objects that have a geographical sector associated with them. Selecting Pass Through will allow objects not associated with a geographical sector to pass through the filter. "Eliminate By" Matches will filter out any objects that have a geographical sector associated with them that matches a Sector ID in the Sector ID field. If the Sector ID filed is left blank and "Eliminate By Matches" is not checked then any object with a sector is filtered out. However, if the Sector ID filed is left blank and "Eliminate By Matches" is checked then any object with a sector is passed through to the next tool.

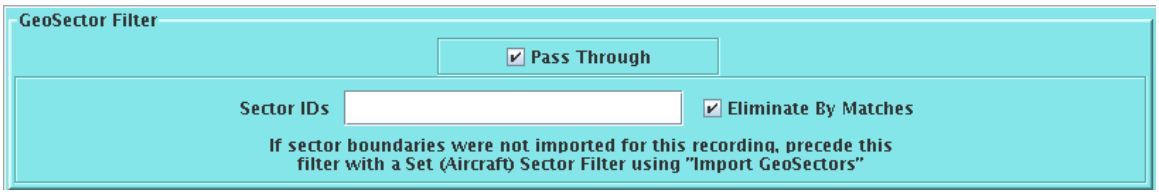
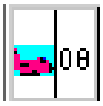


Figure 30

5.2.9 HFL Handoff to Boundary Filter



The HFL Handoff to Boundary Filter takes the name of a HFL Handoff Accept file and sends data for an aircraft found in the file from when the handoff is accepted to when the aircraft crosses the sector boundary into the sector. If pass through is checked, then data found for the aircraft not in the file is sent.

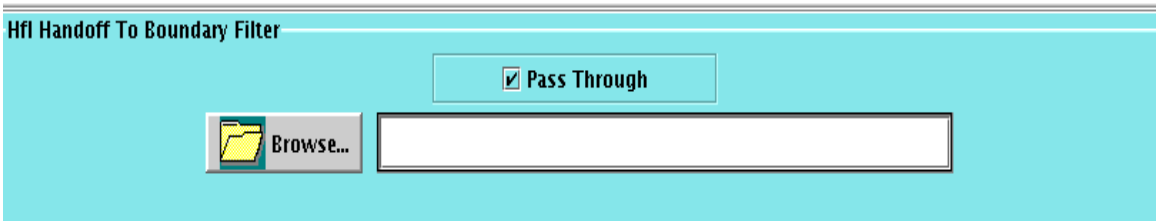
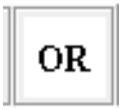


Figure 31

5.2.10 OR Filter



The OR Filter takes two or more tools and sends data that was sent from any of the filters or factories. If the allow duplicates button is checked, data sent by multiple filters is sent multiple times. If the button is not checked, the data is only sent once.

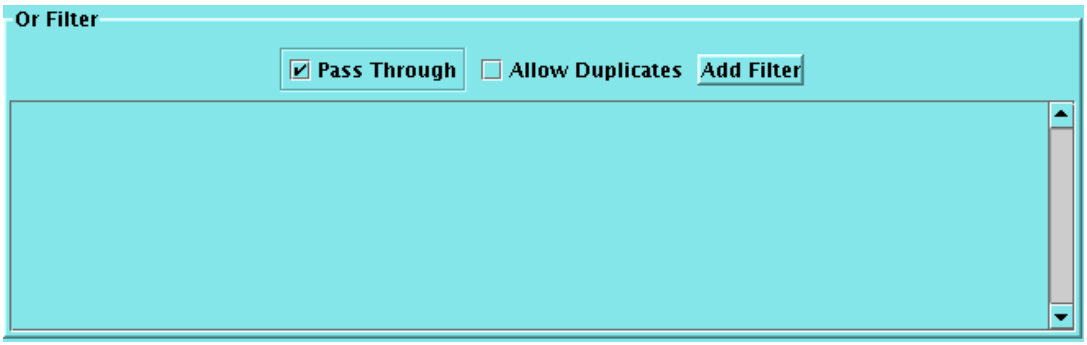


Figure 32

5.2.11 Pilot Command Filter

The Pilot Command Filter filters pilot commands by the type of command. By default, all types of pilot commands are selected. Selecting Pass Through will allow non-SimPilot command objects to pass through the filter. The following is a list of pilot command types the can be used to filter:

- Altitude – Any altitude commands
- Heading – Any heading commands involving magnetic heading
- Ground Heading – Any heading commands involving ground track heading
- Speed – Any speed commands
- Approach – Any approach clearance commands
- Localizer Route – Any command to follow the localizer route. Does **not** include Approach commands.
- Communication – Any commands dealing with communications such as handoff or squawk
- Cross – Any crossing commands
- Hold – Any In Air Hold commands such as Hold Present Position
- Ground Hold – Any Ground Holds commands
- Missed Approach – Any Missed Approach commands
- Prompt – Any text sent to the SimPilot Workstation using prompt command
- Route – Any route commands such as Star or Direct
- Simulation Report – Any command that causes a report about an aircraft's state in the simulation to be issued
- Start – Any Start commands
- Takeoff – Any Takeoff Commands
- Taxi – Any Taxi Commands
- Touch and Go – Any Touch and Go Commands
- Reroute – Any Reroute Commands
- Terminated –Any command to terminate an aircraft from the simulation
- Then – Any Then commands
- Ground Other – Any command that can only be issued to aircraft on the ground that is not covered by an above category such as Exit Runway
- Other – Any command not covered by an above category such as Prep for Approach
- ADM Control – Any ADM control Commands.
- File – Any File Route Commands
- Refuel – Any Refuel Commands

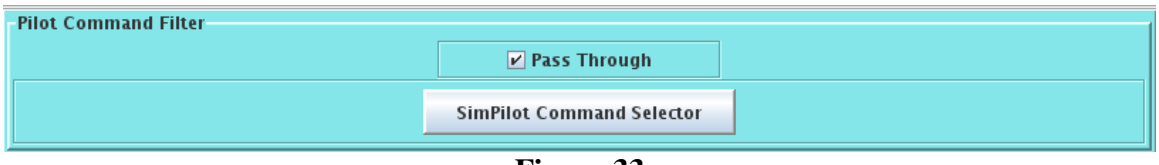


Figure 33

5.2.12 Pilot Command Source

The Pilot Command Source Filter filters pilot commands by the source of the command. By default all SimPilot commands are passed through the filter. The user can select to filter commands based on a single source.

The following is a list of exclusive sources:

- ActiveMQ SimPilot Cmd – command issued via TGF's ActiveMQ SimPilot Command Interface.
- Aircraft prompt method – Prompt sent to SPW by internal prompt method.
- Airspace Action Markup Language – command issued by a Region
- Approach Command – internal command issued by approach command.
- At Fix Command – internal command issued by at fix command
- At Time Command – internal command issued by at time command
- Canceled Conditional Command – not currently used.
- Cockpit – command issued by external cockpit simulator.
- Create New Filed Route – internal command issued by File command.
- Datalink Dmsg – not currently used.
- Datalink Equipment – command issued by Datalink equipment.
- Gate Command – internal command issued by gate command
- Maintain Command – internal command issued by maintain command.
- RNAV Approach Command – internal command issued by RNAV approach command.
- Remote Eco GUI – command issued by remote Eco GUI.
- Route – command issued by Aircraft's route.
- Route Command – internal command issued by route command.
- Runway Command – internal command issued by runway command.
- Set Frequency Call – internal command to assign Aircraft to a SPW issued when the Aircraft changes sectors.
- SimPilot Workstation Assigner – command issued by TGF's SimPilot Workstation Assigner.
- Sim Event File – command issued due to an event in a Sim Event file loaded into the simulation.
- Simulation Action Viewer – command issued from Diagnostic Tool attached to Eco GUI.
- Sp Command Receiver – command issued from a remote source such as a SPW or Desiree.
- Sector Sp Command – command issued to all aircraft on a specific sector.
- Sp Command Service – command issued from a remote source using the TGF's SpCommandService Interface.
- Sp Training Service – command issued by SimPilot Training System.
- Spot Command – internal command issued by spot command.
- Star Command – internal command issued by star command.
- Then Command – internal command issued by then command.
- Unknown – command issued by a source not covered above.

The follow is a list of inclusive sources:

- ActiveMQ – command issued by ActiveMQ sources
- Datalink – command was issued either by Datalink Equipment or a Datalink Message.
- Eco – command was issued by either the Remote Eco GUI or the Simulation Action Viewer.
- Internal – command was issued internally by TGF.
- None – commands from any source.
- Sp Service – command was issued by either the Sp Command Service or from a Sp Command Receiver.

The Rest of Source field uses a regular expression to narrow the source. Selecting Filter Commands will filter out unsuccessful commands. Selecting Pass Through will allow non-SimPilot command objects to pass through the filter.

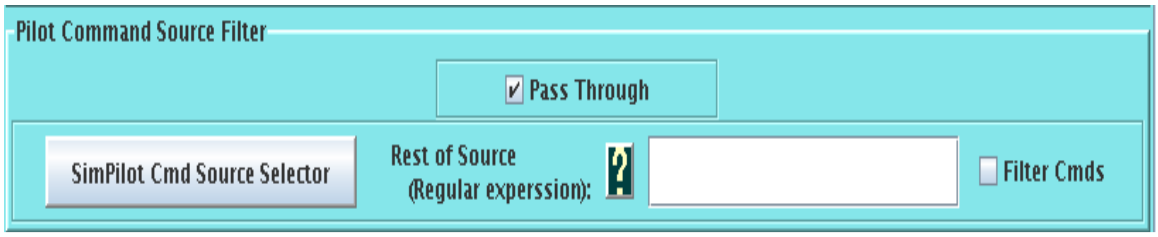


Figure 34

5.2.13 Runway Filter

The Runway Filter passes aircraft objects (e.g. Aircraft State data objects) that have an associated runway. The runways are specified by airport/runway ID, for example; BWI/07L, BWI/27R.

Selecting the following will produce a list of all aircraft landing at Baltimore International Airport on Runway 7 Left with state information for their first active second:

- Recordable Reader
- Aircraft Filter (blank to select all aircraft; Pass Through off)
- Runway Filter (BWI/07L; "Arrival runways only")
- First Occurrence of Name Filter
- Text Writer

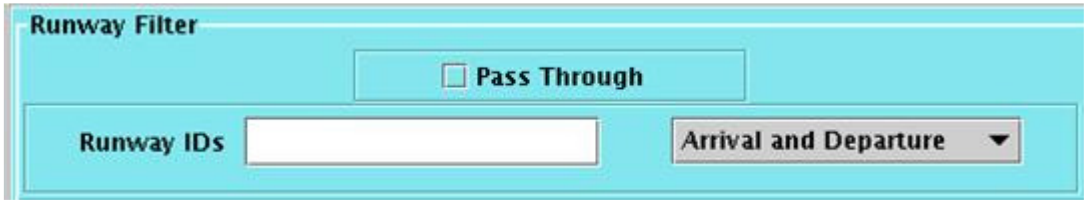


Figure 35

5.2.14 Sector Filter

The Sector Filter allows the filtering of objects that have sectors associated with them. Selecting Pass Through will allow objects not associated with a sector to pass through the filter. If "Eliminate By Matches" is selected then all objects with a sector matching any specified in the Sector ID field will be filtered out. If the Sector ID filed is left blank and "Eliminate By Matches" is not checked then any object with a sector is filtered out. However, if the Sector ID filed is left blank and "Eliminate By Matches" is checked then any object with a sector is passed through to the next tool.

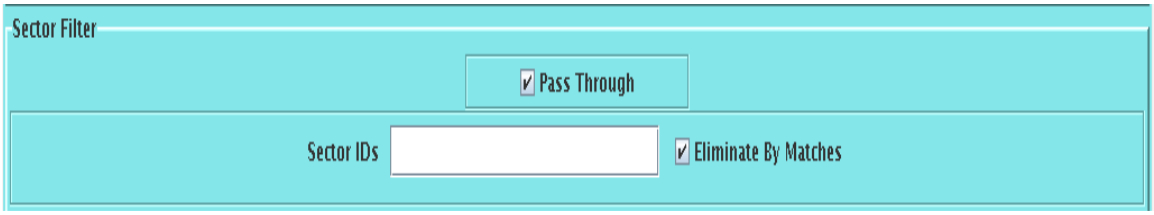
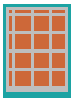


Figure 36

5.2.15 Set Aircraft Sector Values



The Set Aircraft Sector Values Filter allows the correction of recordings run with incorrect sector information. In addition, this filter allows null sectors to be set to a given value. It can also be used to update old recordings to match updated/modified sectors. If "import GeoSectors" is selected, then this Filter will update geographical data for the sector. Use the Sector XML file field to specify where DRAT should look for the TGF Sector, Node, and FPA XML files.

Figure 37

5.2.16 Text Filter

The Text Filter filters objects based on the text output they would generate for Text Writer. The user is allowed to select a search template to look for in the data object text. The template for the search text is expressed in regular expression format; to access an explanation of the regular expression format, click the question mark icon on the panel. If "Send events with match result of true" is checked, then only objects whose text matches the specified template are sent onward. Otherwise, only objects whose text does not match the specified template are sent onward.

Figure 38

5.2.17 Time Filter

The Time Filter allows for the filtering of events that occur within a set time frame. The events occurring before the start time and after the stop time are discarded.

Figure 39

5.2.18 Time Sampler

The Time Sampler samples time-stamped data objects by only sending the objects that occur at a multiple of a time interval. The start time is the first point in time for which time-stamped data objects are sent, and the interval indicates how long it is between subsequent samplings of the time-stamped data objects. For example, if the specified start time is 2 and the specified interval is 10, the filter will send all data objects with timestamps of 0:00:02, 0:00:12, 0:00:22, 0:00:32, etc. Data objects without timestamps are sent if the Pass Through box is checked. If the "Remove Only Aircraft" box is checked then only data objects associated with an aircraft are filtered out. If "Include Millisec" box is checked, then 10:00:00.01 is the same as 10:00:00.

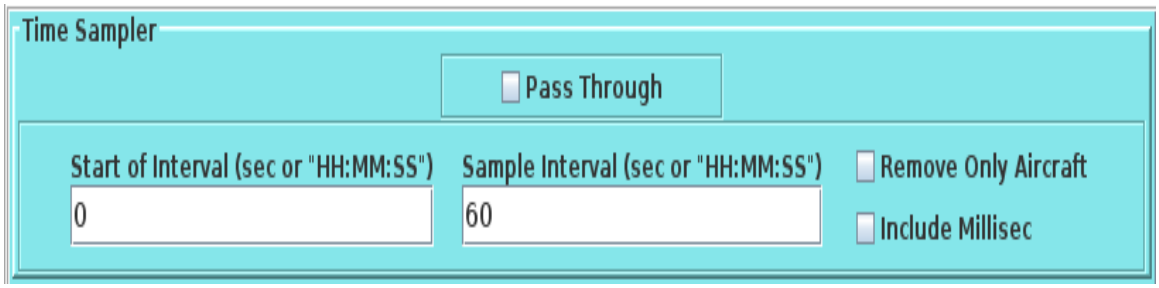


Figure 40

5.2.19 Universal Flight Plan Filter

The Universal Flight Plan Filter filters on objects based on the data in the Universal Flight Plan (UFP). The UFP is a TGF simulator input that describes the initial flight characteristics of an aircraft: the UFP field details are accessible from the TGF documentation website at http://www.faa.gov/go/tgf/ in the "TGF XML Flight Plan Format" manual. The user is allowed to select a search template to filter on for the UFP field. The template for the search text is in regular expression format; to access an explanation of the regular expression format, click the question mark icon on the panel. If the "Send events with match result of true" is checked, then only objects that have a UFP with matching data are sent onward. Otherwise, only objects that have a non-matching UFP are sent onward.

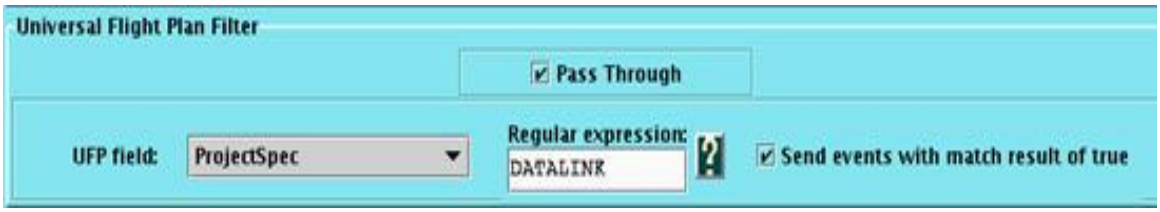


Figure 41

5.3 Factories

A factory creates a new type of data object from other data objects received. A data object is a set of related information such as aircraft information, fix information, or pilot command information. A factory combines information from existing data objects and then generates new sets of information or, new data objects.

Most factories have a "Pass Through" selection option. This field is an option if there is a question of whether to send objects that are not generated by this factory.

5.3.1 Aircraft Field Duration Factory

The Aircraft Field Duration Factory creates duration information based on same values of the selected aircraft state data. The Min duration field contains the minimum duration to report, while the Max duration field contains the maximum duration to report. Clicking on the Aircraft Field Selector button displays a list of field value to select from. The default field value is Sector. If Pass Through is selected then Non-Aircraft State objects are passed through the factory.

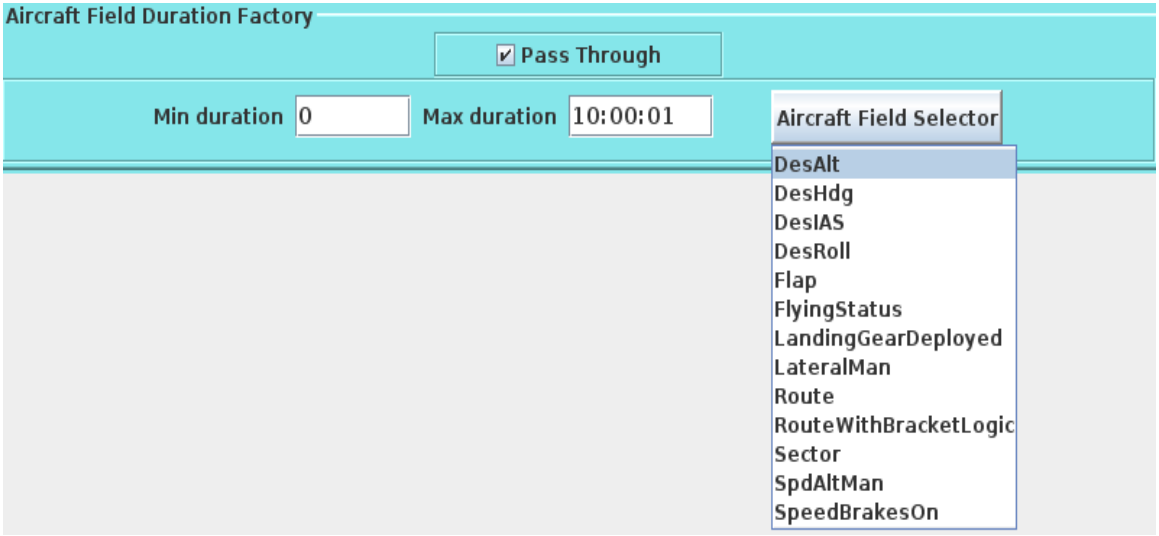


Figure 42

5.3.2 Altitude and Speed Error Factory

The Altitude and Speed Error Factory generates per second information about the difference between an Aircraft's current altitude/indicated airspeed/mach/altitude rate and the Aircraft's desired altitude/indicated airspeed/mach/altitude rate. If Pass Through is checked then non-Aircraft objects are passed through.

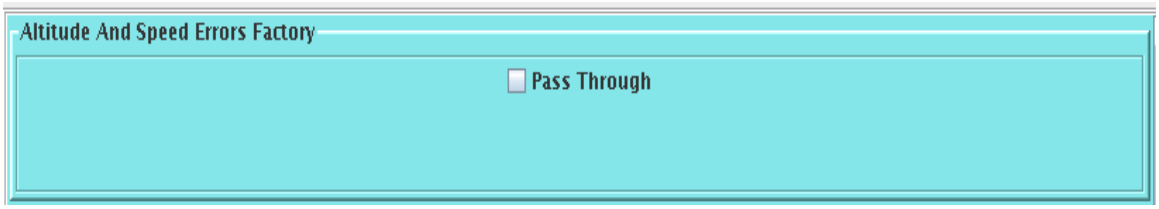


Figure 43

5.3.3 Approach Pullout Factory

The Approach Pullout Factory generates information about when aircraft on approach have been pulled off approach (e.g., for spacing). The Factory counts the aircraft on approach and determines if they have been given a command that would pull them out of an approach:

–Pull Out Commands (definitely will cause an aircraft to pullout):
- ○Missed Approach
- ○Heading
- ○Term
- ○Hold
- ○Prep Approach

–Question Commands (could potentially cause an aircraft to pullout):
- ○Altitude
- ○Put on localizer but never cleared to make approach
- ○If it gets multiple CLA commands

Two options for counting the approaches exist:
- Including localizer commands without an approach command (because the aircraft will never descend and land).
- Counting ONLY aircraft commanded to approach (excludes localizer-only commands).

Touchdown will cause the aircraft to be removed from the list of aircraft to check for a pullout-type command.

Note: Aircraft given a CLA command but not yet land by the end of the simulation are not counted.

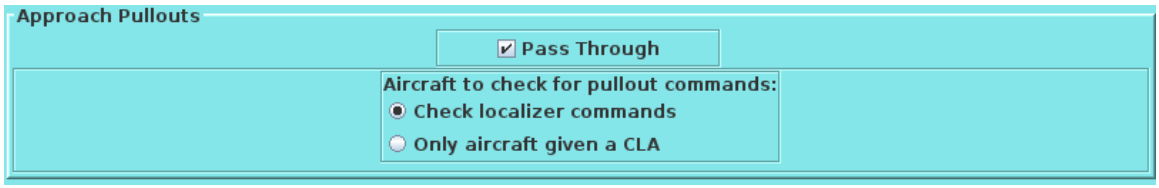


Figure 44

5.3.4 Data Object Count Factory

The Data Object Counter counts objects over a specified interval. Objects can be selected by type, by name, or both at the same time. Selecting Pass Through allows the data objects being counted to pass through the factory (possibly to provide a frame of reference). If the box Count Name Once is checked (turned on) then violations spanning more than one interval are not counted more than once. The Name field may a regular expression. If you need more information on regular expressions press the help button next to the Name field.

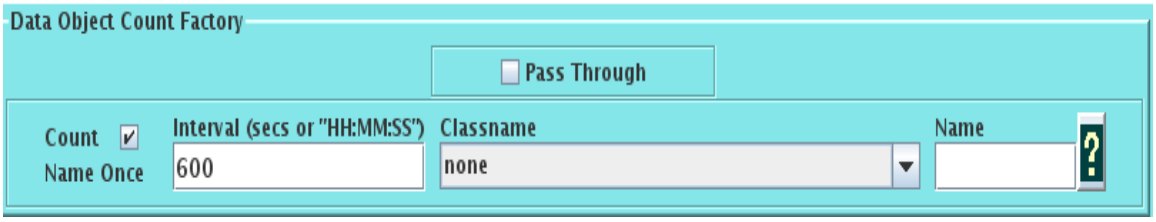


Figure 45

5.3.5 Distance Factory

The Distance Factory generates distance information about an aircraft and another object. The other object must have a location such as a fix, another aircraft, or a runway.

Selecting Pass Through will allow all objects received to pass through the factory (including the objects the distances are calculated from). The "Aircraft passed through" choice box enables filtering of objects associated with an aircraft:

- NO_AIRCRAFT – filter out any objects associated with an aircraft
- ALL_AIRCRAFT – pass through any object associated with an aircraft
- DISTANCE_MATCH – filter out only objects associated with an aircraft that do not match the minimum distance specified.

The following distance information can be generated:

- VIOLATE_SEP – all pairs of aircraft violating the specified separation. For more information see Section 5.3.5.1.
- VORTEX_SEP – aircraft violating ATC wake vortex separation. For more information see Section 5.3.5.2.
- CLOSEST_AC – closest aircraft to specified aircraft for each second. For more information see Section 5.3.5.3.
- SITE_DIST – closest aircraft to a specified site for each second. For more information see Section 5.3.5.4.

This Factory will generate a Distance Second report. See Section 6 The DR&A Objects for more information.

5.3.5.1 VIOLATE_SEP

By default the Distance Factory is setup to look at Violation Separation. The Min Dist and Min Alt are used to define what the minimum altitude and distance separation the two aircraft must maintain before they are considered to be in violation with one another. If the "Allow External Aircraft" box is checked, then Externally provided Aircraft are included in calculations. More information on External Aircraft see Section 12.

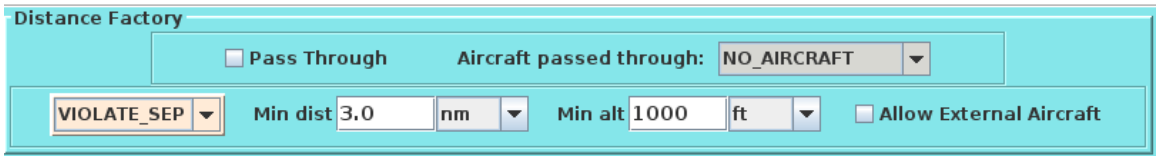


Figure 46

5.3.5.2 VORTEX_SEP

Wake Vortex Separation allows the user to select whether to use Terminal or EnRoute Separation by selecting the "Use Terminal Rules" checkbox. The user can also choose whether to sort the Acids of the Aircraft involved. This may cut down on the number of individual Wake Vortex Violations found. For more information on wake vortex separation see Section 10 Wake Vortex Turbulence Separation. If the "Allow External Aircraft" box is checked, then Externally provided Aircraft are included in calculations. More information on External Aircraft see Section 12.

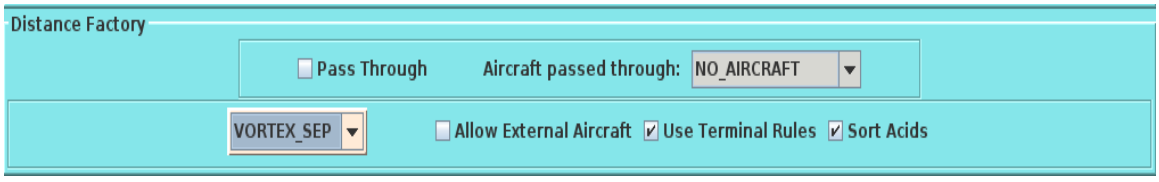


Figure 47

5.3.5.3 CLOSEST_AC

Closest AC allows the user to specify the Aircraft ID (ACID) of the aircraft to look for another Aircraft that came closes to the specified Aircraft.

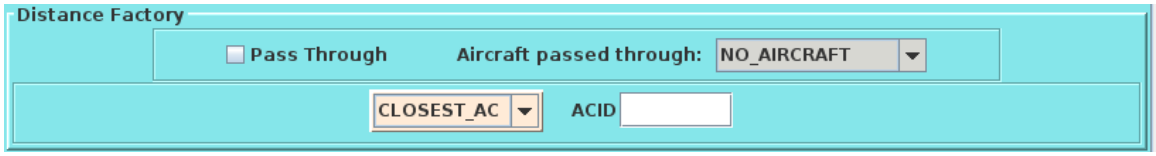


Figure 48

5.3.5.4 SITE_DIST

The Site Distance allows the user to specify the name of either a Fix or Airport and the maximum distance to look at. The Aircraft that is the closest to the given site without out exceeding the given maximum distance will be included in the data generated.

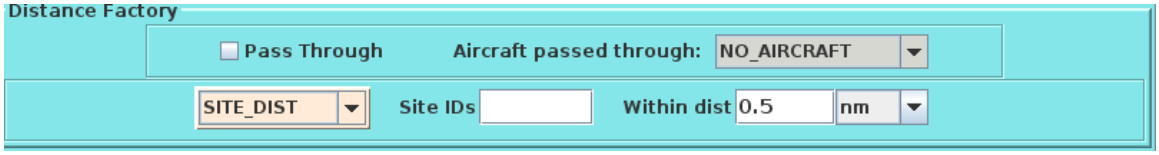


Figure 49

5.3.6 Distance Summary Factory

The Distance Summary Factory provides some detail on separation violations that have occurred. The output info for each violation consists of aircraft IDs of the aircraft involved, time, distance between aircraft, aircraft position, and sector information, at the first second of the violation, at the last second, and at the Closest Point of Approach (CPA). The separation violation can be either for a defined distance and altitude (including standard violations) or for a wake vortex check (following in trail). The duration field tells the durations of the violations to look for. For more information on Distance Factory settings see Section 5.3.5 Distance Factory.

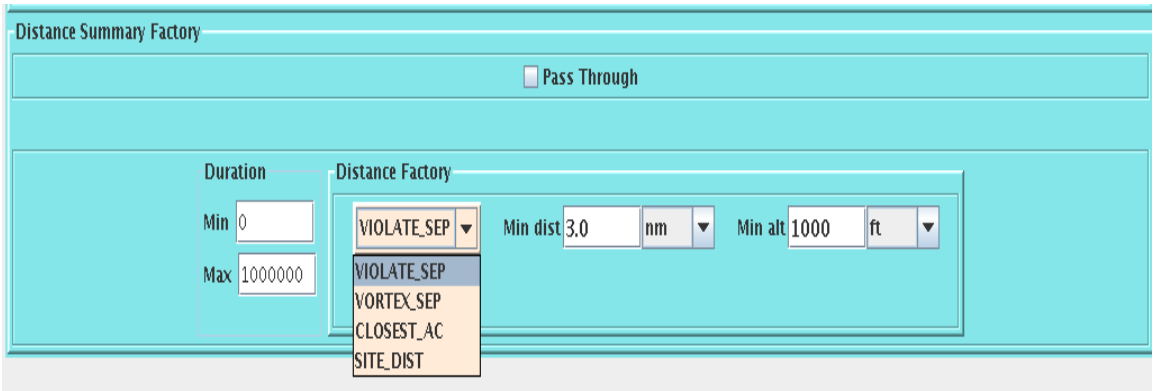


Figure 50

5.3.7 Distance Flown Between Fixes Factory

The Distance Flown between Fixes Factory generates information about the distance flown by aircraft between a given set of fixes. At least two fixes or latitude/longitude need to be specified in the Fix(es) Field. The user can specify whether to pass on the individual second-by-second data by checking the Pass Individual box. The Distance to Fix is the how close an Aircraft must come a given Fix in order for the Factory to generate information.

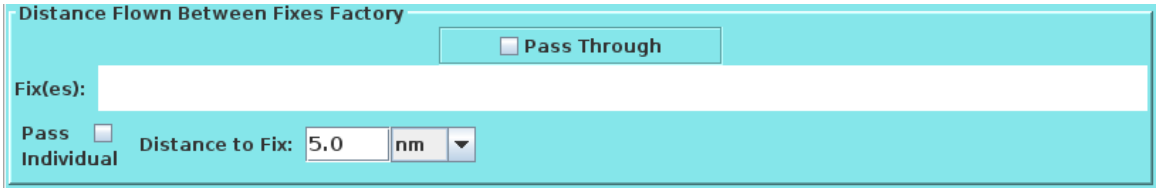


Figure 51

5.3.8 Duration Factory

The Duration Factory generates duration information on types of objects that occur every second. Both minimum and maximum duration can be specified. Selecting Pass Through allows data objects not generated by the duration factory to pass through (possibly to provide a frame of reference).

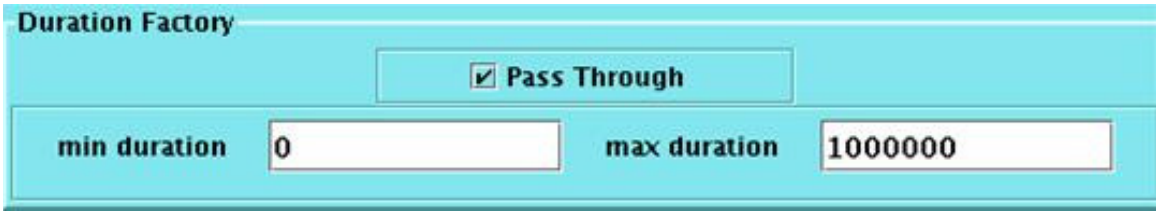


Figure 52

5.3.9 Event File Combiner Factory

The Event File Combiner Factory combines input from several delim writable objects into one comma-delimited output file. For example, Flight Terminated and Flight Activated Events would be combined into one file.

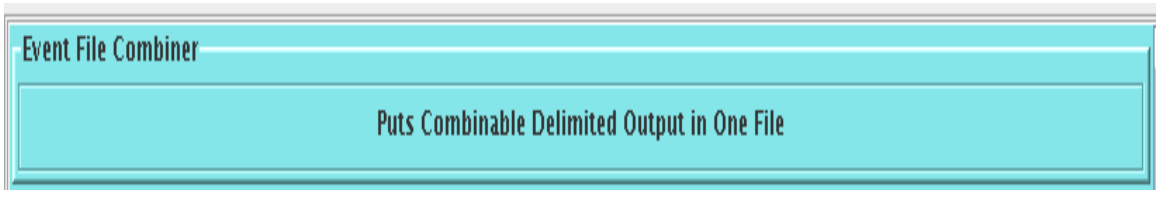


Figure 53

5.3.10 Fix Metering Factory

The Fix Metering Factory produces a report about the metering of Aircraft over a given Fix. Fixes or latitude/longitude to look at need to be specified in the Fix(es) Field. The user can specify whether to pass on the individual second-by-second data by checking the "Pass Individual" box. The Distance to Fix is the how close an Aircraft must come a given Fix in order for the Factory to generate information. If "Count Ac Once" is checked, then only the first time an Aircraft passes over a Fix is included. The "Max meter dist" is the maximum distance to look for an Aircraft behind the Aircraft passing over the fix.

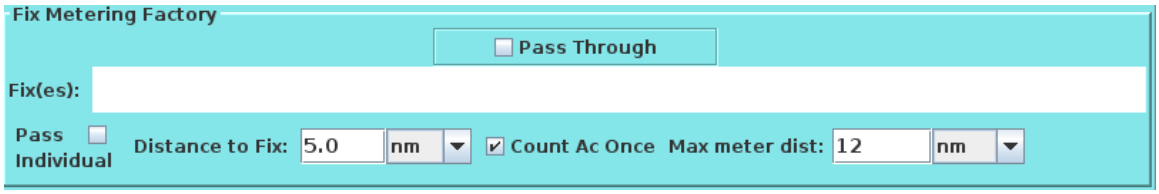


Figure 54

5.3.11 Fuel Burn Factory

The Fuel Burn Factory generates a data object that can be written as text that was designed to be imported into a fuel burn calculation tool. This was a special use tool requested by a customer. **Note: The data produced by this factory is for use by relative not absolute studies.**

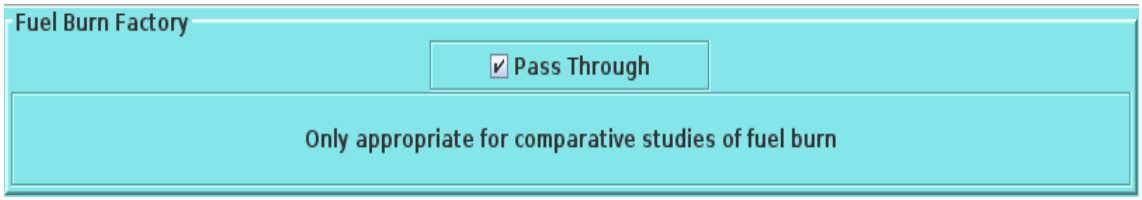


Figure 55

5.3.12 Geo Sector Counter Factory

The Geo Sector Counter Factory generates data about the number of aircraft in a GEO Sector over the course of a given interval. Selecting Pass Through will allow objects not produced by this Factory to pass through. The user can specify the interval in the field provided.

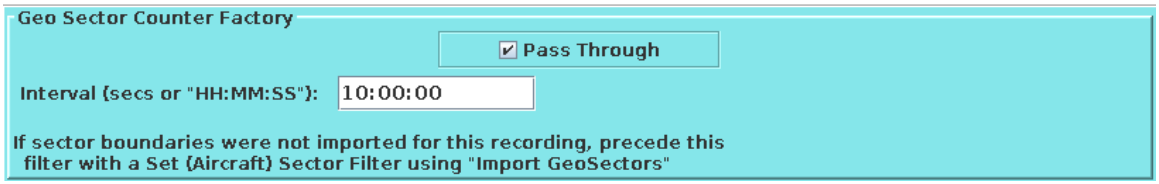


Figure 56

5.3.13 Ground Factory

The Ground Factory in TGF's DRAT allows the user to optionally specify a Geometry file that specifies the shape of a runway's run-up pad as well as where the ramp area of an airport is located. The factory provides reports which contain the following information about a ground simulation:

- Departing Flights (An aircraft is counted as a departure once its wheels go up.)
  - Id of aircraft data is about.
  - Total time spent taxiing (includes taxiing to take off) measured in seconds.
  - The amount of time measured in seconds it takes an aircraft to get from a SPOT to when it gets its wheels off of the ground while taking off from its departure runway (includes time spent waiting to move). **Note: This value will be zero if an aircraft never goes over a spot or never goes to take off from an airport.**
  - The name of the runway the aircraft departed from.
  - The id of the aircraft (if any) that departed previously from the same runway. **Note: This value will be blank if the aircraft is the first one to take off from a given runway.**
  - The amount of time measured in seconds between this aircraft and the aircraft that previously departed from the same runway. **Note: This value will be blank if the aircraft is the first one to take off from a given runway.**
  - The amount of linear distance measured in feet between this aircraft and the aircraft that previously departed from the same runway. See Figure 57 for a picture of the distance measured. **Note: This value will be blank if the aircraft is the first one to take off from a given runway.**
  - Total time spent taxiing in order to reach an aircraft's departure runway's run-up pad measured in seconds. **Note: This value will be zero if the aircraft started up in its departure runway's run-up pad.**
  - The amount of time an aircraft spent in its departure runway's run-up pad (as defined in the specified Geometry File) measured in seconds. **Note: This value will be blank if the user does not specify a Geometry file.**

- Arrival Flights (An Aircraft is considered an arrival once its flying state changes to landed.)
    - Id of aircraft data is about.
    - The distance measured in feet from the threshold of the aircraft's arrival runway to when aircraft finished exiting the runway.
    - The amount of time measured in seconds from when an aircraft crossed the threshold of its arrival runway to when an aircraft finishes exiting the runway.
    - Total time spent taxiing (includes taxiing to exit runway) measured in seconds.
    - The total time measured in seconds an aircraft spends taxi from when it finishes exiting its arrival runway to when it reaches the ramp area as defined in the Geometry file. **Note: This value will be blank if the user does not specify a geometry file.**
    - The name of the runway the aircraft landed on.
    - The id of the next aircraft to land on the same runway. **Note: This value will be blank if the aircraft is the last one to land on a given runway.**
    - The id of the closest aircraft scheduled to land on this aircraft's arrival runway at the time this aircraft lands. **Note: This value will be blank if the aircraft is the last one scheduled to land on a given runway.**
    - The time between when this aircraft landed on its arrival runway and the next aircraft to land. **Note: This value will be blank if the aircraft is the last one to land on a given runway.**
    - The horizontal distance measured in feet between this aircraft and the Next Landing Aircraft. See Figure 58 for a picture of the distance measured. **Note: This value will be blank if the aircraft is the last one scheduled to land on a given runway.**
    - Overall Statistics
    - Number of aircraft that actually landed at an airport.
    - Number of aircraft that actually took off at an airport.
    - Number of aircraft in the simulation that had an arrival airport and runway.
    - Number of aircraft in the simulation that had a departure airport and runway.
    - Average time between departing aircraft measured in seconds.
    - Average distance between departing aircraft measured in feet.
    - Average time between arriving aircraft measured in seconds.
    - Average distance between departing aircraft measured in feet.

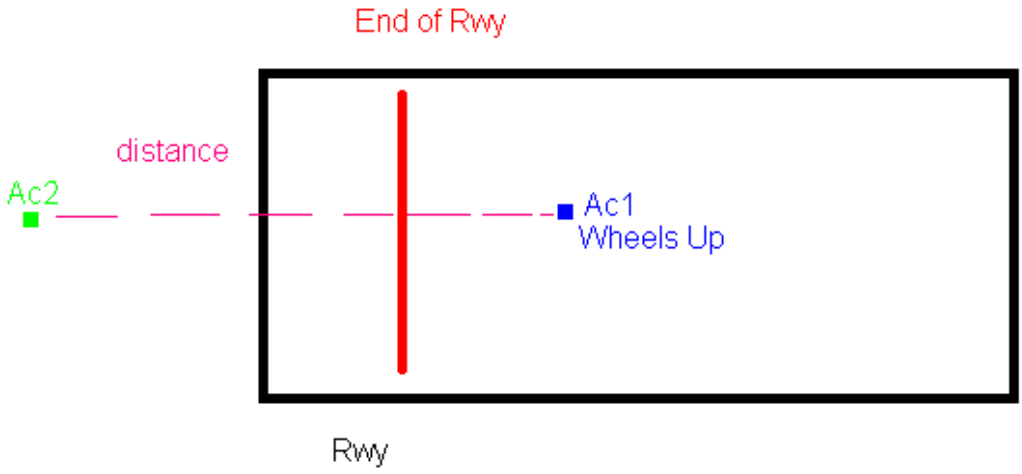


Figure 57 Picture of distance measured between departing aircraft.

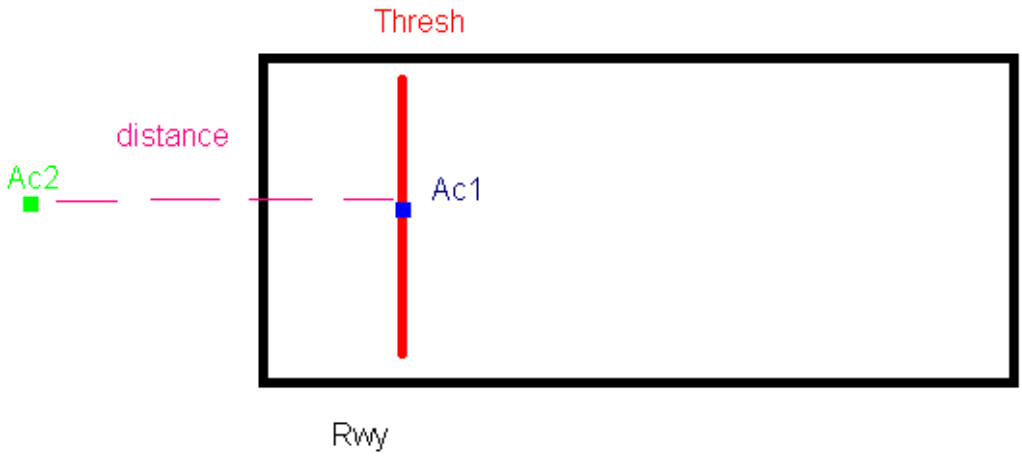


Figure 58 Picture of distance measured between landing aircraft.

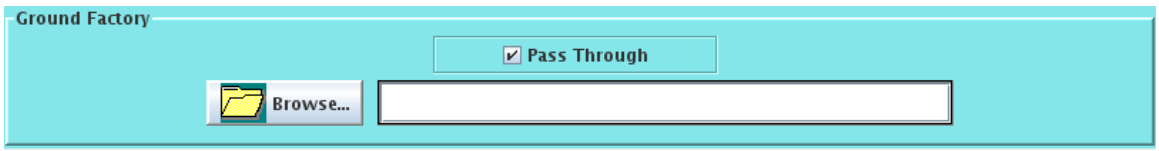


Figure 59

5.3.14 Ground Speed Factory

The Ground Speed Factory generates detailed a report an Aircraft's ground track speed for a given time in the simulation. The report generated contains the following:

- Time in the simulation
- The Aircraft's Id (Acid)
- The Aircraft's recorded ground track speed according to TGF
- The calculated "instantaneous" ground speed calculated from the Aircraft's current position and its previous position. If value will be blank if there was no previous position received.
- A running average of the last X TGF Ground Track Speed values, where X is the maximum number of values to include in the average.

If the "Pass Through" option is not checked, then only data generated by this factory, simulation termination, and end of epoch messages are sent onward.

"Max Num Values" field is where the user can specify the maximum number of values to include in the average. If no value specified, then there is no maximum number of values to include.

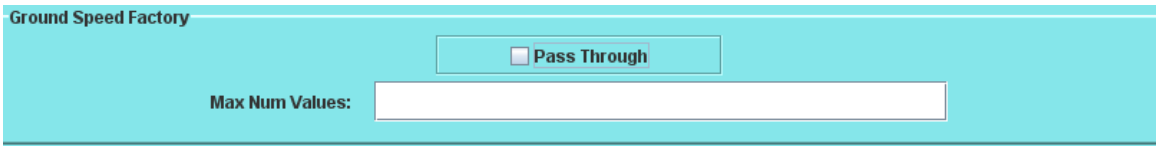


Figure 60

5.3.15 HFL EnRoute Summary Factory

The HFL EnRoute Summary Factory provides statistics on simulation complexity for a sector over intervals of time, including several types of violations: standard separation violation (report abbreviation: secnf), a user defined separation violation (ecnf), between sector standard violations (bscnf), and No Transgression Zone (NTZ) area boundary violations (ascnf); number (N) and duration (D) of these outputs are provided, along with hold delays (htdly), takeoff delays (stdly), and other information.

The inputs to the HFL EnRoute Summary Factory include the interval of time to count the summary data for and the start time of the first interval (if the interval start is "5:00" and the interval is "10:00", the summary information will count over the intervals: 5-15 min, 15-25 min, 25-35 min, 35-45 min, etc.). The "HFL" titled fields are all simulation identifiers requested by the Human Factors Lab. Horizontal and vertical separations are for the user defined separation outputs. Zero or more NTZ conflict zones can be specified, either in Latitude/Longitude or in X-/Y-coordinates with a stereographic map projection. If the "Count only specific cmds" box is checked, then only successful commands are counted. If the "Allow External Aircraft" box is checked, then Externally provided Aircraft are included in calculations. More information on External Aircraft see Section 12. Pass Through is not provided as an option: the only data objects sent by this factory are the ones it has constructed.

If the user wishes to precede this factory with filters to limit the data that is counted toward the aggregate, care must be taken not to remove too much information, since a wide range of data objects is utilized to construct the summary data objects.

Figure 61 HFL EnRoute Factory without NTZ Area

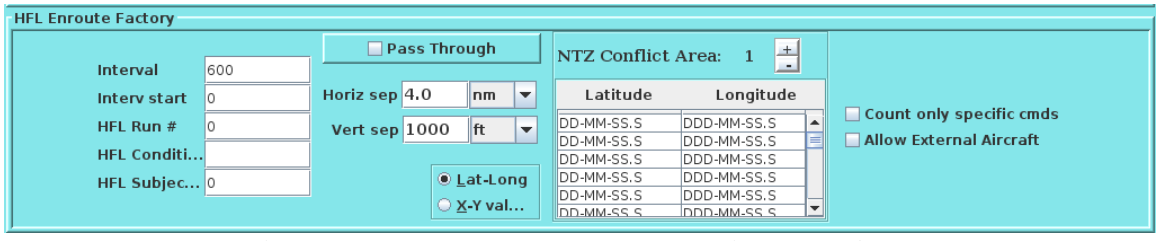


Figure 62 HFL EnRoute Factory with NTZ Area

5.3.16 HFL Ground Factory

The HFL Ground Factory provides reports which contain the following information about a ground simulation:

- Duration of Taxi Time In for each aircraft– time from when an aircraft lands to when it terminates out of the simulation.
- Duration Taxi Time Out for each aircraft – the time from when aircraft initially starts to taxi to when an aircraft takes off.
- Duration of the delay for each aircraft.
- Duration of the time to initial taxi clearance for each aircraft– time from initial activation in the simulation to first movement: this is only applies to departures.
- A total number of aircraft with a delay time, which is the taxi time out minus the minimum delay to report.
- Total number of departures.
- Total number of arrivals.
- Total number of delayed aircraft
- A total of the following commands issued by Desiree/Datalink:
    - Takeoff
    - Hold Short
    - Stop
    - Taxi
    - Taxi into Position and hold
    - Frequency Change
    - Speed
    - Altitude
    - Heading

Min Delay Duration is the minimum delay duration in seconds to report. If Filter Cmds is checked then unsuccessful SimPilot Commands are filtered out. If Pass Through is checked than all objects are passed through the filter. To include a SimPilot Workstation (SPW) whose host name was not known at the time of the Simulation or does not contain SP simply click on the Edit SPW List and type the SPW's address or host name into the field provided.

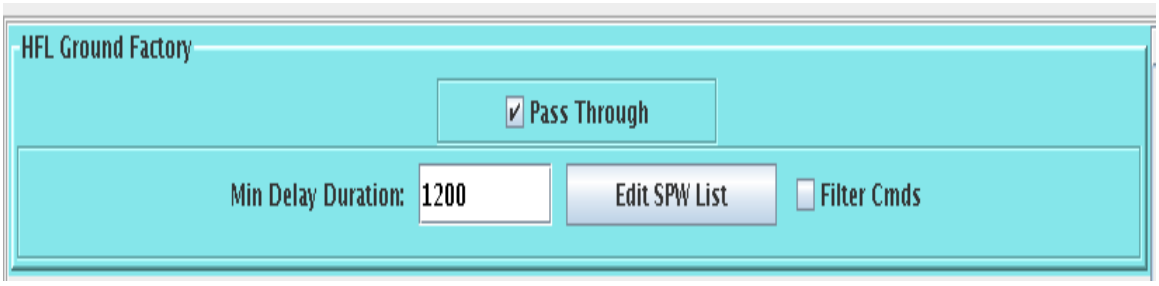


Figure 63

Figure 64

5.3.17 Near Fix Count Factory

The Near Fix Count Factory generates a count of aircraft that pass over/ near a given list of fixes during a specified interval. Selecting Pass Through allows data not generated by this factory to pass through. The Fix(es) field may be a list of Fix names separated by either a space or a comma. If no Fix names are specified, then whenever any aircraft passes over any fix on its route is counted. Selecting Pass Individual sends through the objects that where counted. The Distance is how close an Aircraft must get to a fix not on its route for it to be counted.

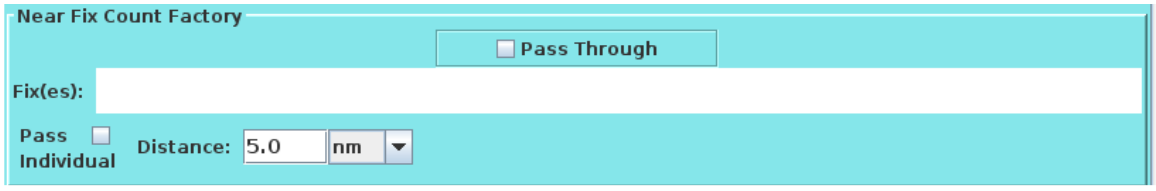


Figure 65

5.3.18 PTT Duration Factory

The PTT Duration Factory generates duration information on PTT Recordable objects. A PTT Reader must be in the DRAT configuration for this to work. (Please see Section 5.1.2 for more information on the PTT Reader.) Both the minimum and the maximum duration can be specified. Selecting Pass Through allows data objects not generated by the PTT duration factory to pass through (frequently used to provide a frame of reference).

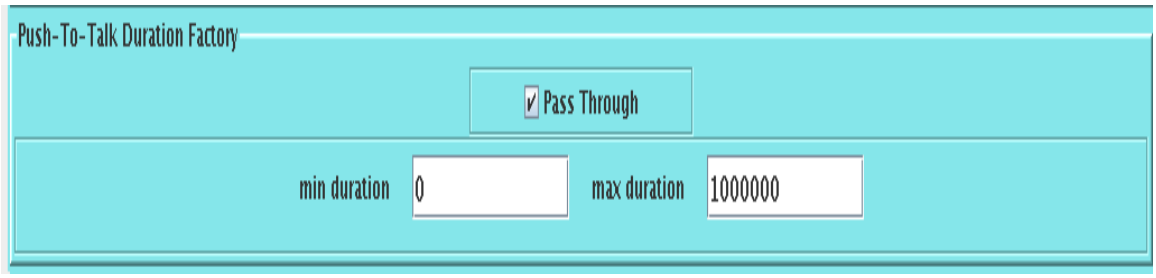


Figure 66

5.3.19 Route Deviation Factory

The Route Deviation Factory generates summary information about when an Aircraft deviates more than an acceptable distance a Route. The ID of the Aircraft to generate information about is specified via the "Acid" field. The Route the Aircraft should follow is indicated via the "Route" field. The maximum distance the Aircraft is allowed to deviate of the Route before information is generated is specified via the "Maximum Allowed Deviation". The user can specify whether to pass on the individual second-by-second data by checking the "Pass Individual" box.

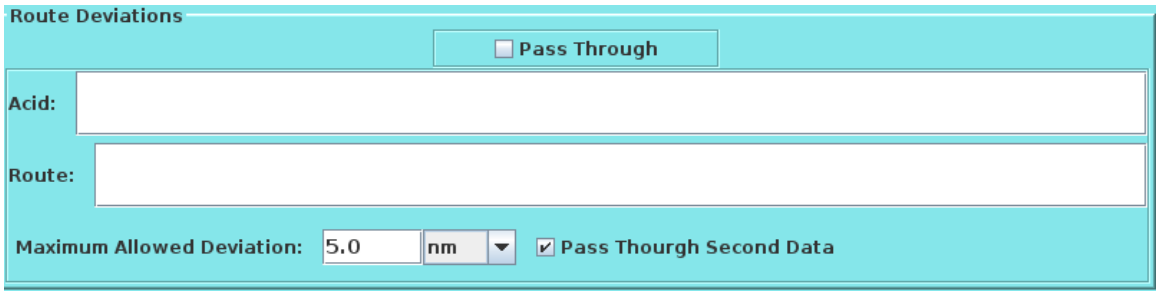


Figure 67

5.3.20 Run Data Factory

The Run Data Factory generates information about how long a simulation was run. If there were any pauses during the simulation than the number and average length of the pauses is given. If the "Pass Through" option is not checked than only data generated by this factory is sent onward.

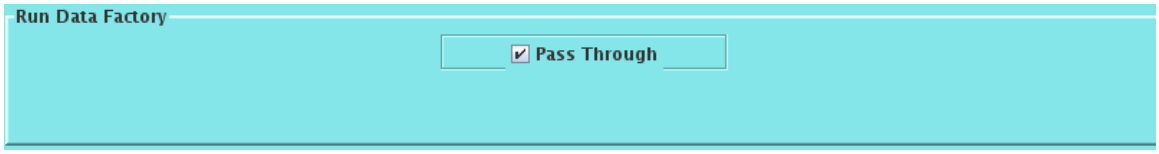


Figure 68

5.3.21 Runway Metering Factory

The Runway Metering Factory generates detailed information about the metering of Arriving Aircraft on a per runway basis. Information about horizontal distance is generated for two aircraft where:

- The lead aircraft is the aircraft that crossed the runway's threshold.
- The second aircraft in the pair is the "closest" aircraft that is up to the maximum specified distance from the lead aircraft, located along the same final (using the same approach to the same runway), and +/- 90 degrees from the lead aircraft's heading.

The following information about the horizontal distance is generated:

- The name of the runway the data is about
- The number of times two aircraft were less than the maximum specified distance apart.
- The average horizontal distance between all sets of aircraft less than the maximum horizontal distance apart.
- The total horizontal distance between all sets of aircraft less than the maximum horizontal distance apart.
- The range of horizontal distances found.
- The minimum horizontal distance found.
- The maximum horizontal distance found.

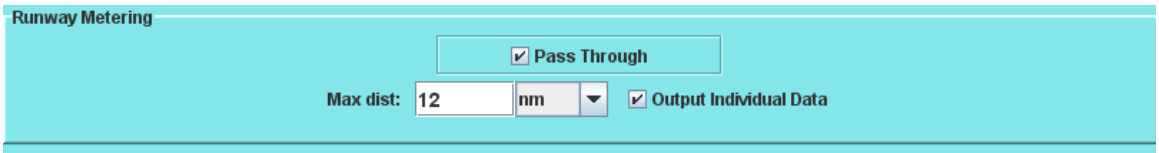


Figure 69

5.3.22 Sp Cmd Count Factory

The Sp Cmd Count Factory generates information on SimPilot Commands issued. The Commands are split up according to the following categories:

- Sector the aircraft was in at the time the command was issued to it.
- Where the command came from. Please see Section 5.2.12 Pilot Command Source for more information on command sources.
- The type of command for example altitude, heading, etc. Please see Section 5.2.11 Pilot Command Filter for more information on command types.

A total count of commands that are in the same sector, source, and type category is given.

If the "Count failed cmds" option is checked, then failed commands are include in results. If the "Pass Through" option is not checked, then all other data except simulation termination and end of epoch messages are filtered out.

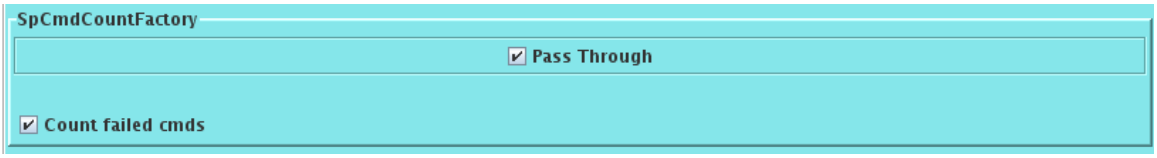


Figure 70

5.3.23 Sp Cmd Location Factory

The Sp Cmd Location Factory generates a report about where an Aircraft was when a heading, altitude, speed, route, or approach command was executed. When DRAT is able to the Aircraft's distant to closest fix on its route is provided. In addition, if an aircraft is on approach to its arrival runway, then the distance to that runway's threshold is usually provided. If the "Pass Through" option is not checked, then all other data except simulation termination and end of epoch messages are filtered out.

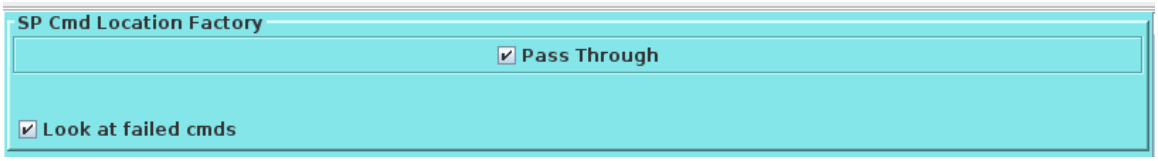


Figure 71

5.3.24 Sp Train Factory

The SP Train Factory generates summary information about a SimPilot Training running. The user can specify whether to pass through the second-by-second information. If the "Pass Through" option is not checked, then all other data except simulation termination and end of epoch messages are filtered out.

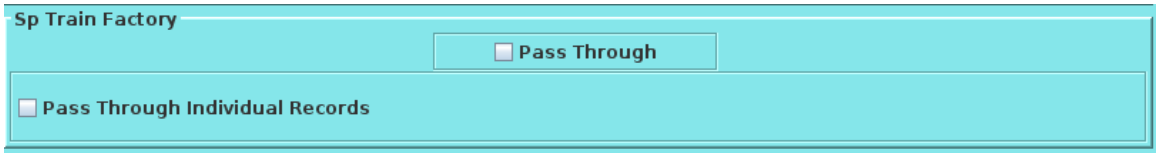


Figure 72

5.3.25 SPW Statistics Factory

The SPW Statistics Factory generates statistical information about SimPilot Workstations (SPW). The user can specify whether to pass through the second-by-second information. If the "Pass Through" option is not checked, then all other data except simulation termination and end of epoch messages are filtered out.

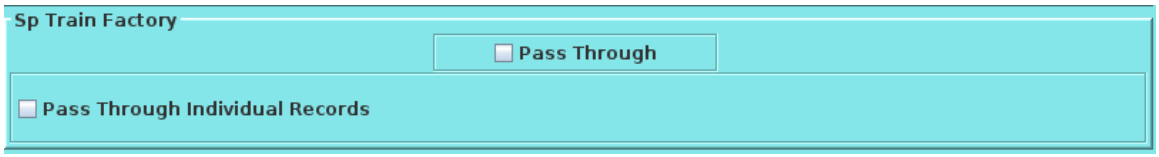


Figure 73

5.3.26 Terminal Simulation Factory

The Terminal Simulation Factory provides statistics on simulation complexity for a sector over intervals of time, including several types of violations: standard separation violation (report abbreviation: stcnf), a user defined separation violation (tcnf), between sector standard violations (bscnf), and No Transgression Zone (NTZ) area boundary violations (ascnf); number (N) and duration (D) of these outputs are provided, along with longitudinal wake vortex violations (lcnf), and parallel violations (pcnf). Other terminal-related information includes the number and duration of aircraft handled (N/Dhand), the number of aircraft completed (Ncomp) and the number of handoffs (Nhoff). The input fields are the same as those of the HFL EnRoute Summary Factory. For more information on HFL EnRoute Summary Factory see Section 5.3.15.

If the user wishes to precede this factory with filters to limit the data that is counted toward the aggregate, care must be taken not to remove too much information, since a wide range of data objects is utilized to construct the summary data objects.

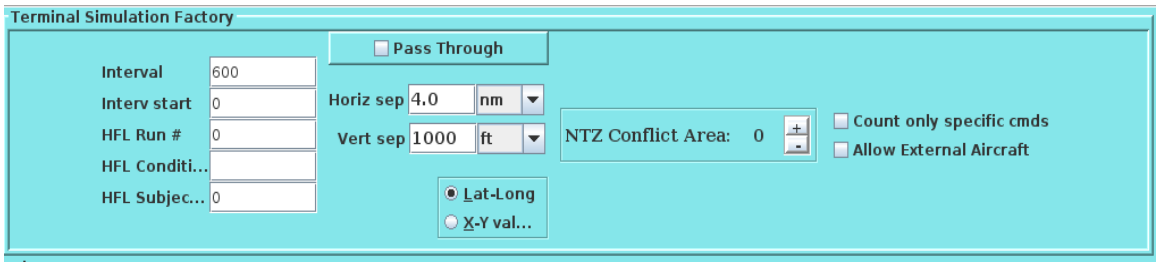


Figure 74 Terminal Simulation Factory without NTZ Area

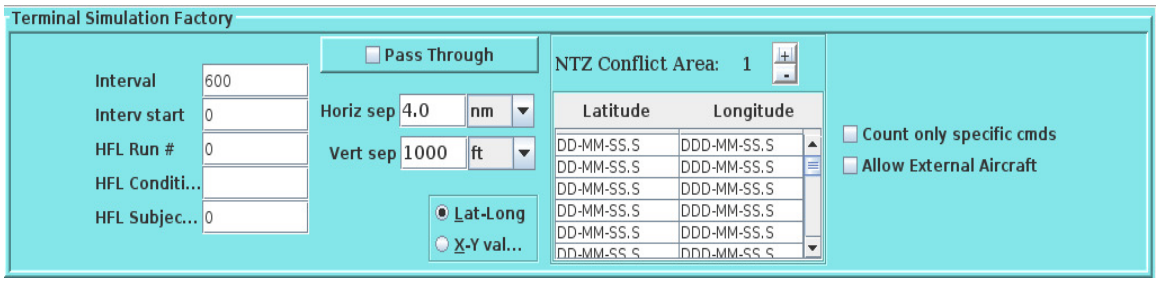


Figure 75 Terminal Simulation Factory with NTZ Area

5.4 The Writers

Writers allow the selection of an output file in a specific format. Each writer generates a report to an output file that can be read by an editor, or sent to a writer. The writers send everything they receive to the next tool, if there is one. Either a writer or a plotter should be the last object in the DRAT tool configuration workspace, because the other tools do not generate an output format.

Nearly all data objects have an output process that is accessible by a Text Writer, which produces easily readable text output for the objects received. Most data objects have an output process that is accessible by a Delimited Writer, which writes the data to comma-separated format.

When the Writers Menu is selected, the file writer tools are listed for selection.

5.4.1 Text Writer

The Text Writer writes easily readable text-format output to a file. The text output is generally in the format "TITLE. Field: <value> Field2: <value2>, …" If XY-coordinates are desired instead of latitude/longitude, then the XY box should be checked and a stereographic point of tangency specified.

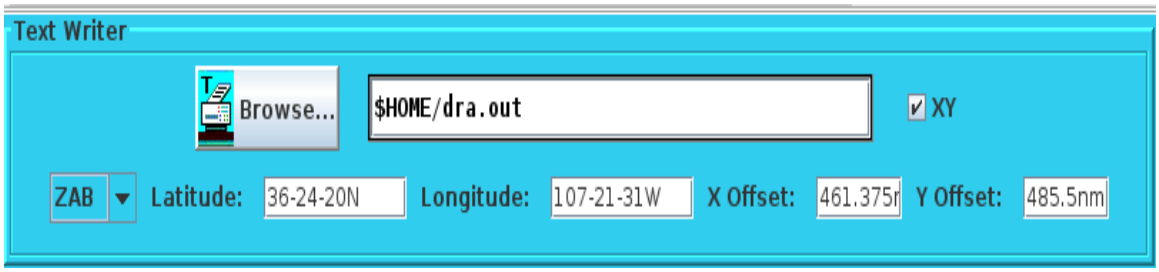


Figure 76

5.4.2 Delimited Writer

The Delimited Writer generates output in a character-delimited format. The most commonly used options on the Delimited Writer are "Report Template", "Use Header", and "Use Description". The path and the format of the file name are specified in the "Report Template" field. If the template contains does not contain an asterisk ("*"), then a directory with the given name and location are created. If the "Use Header" box is checked, then the data output by the Writer will include a header line with field names. If the "Use Description" box is checked, then the data output by the Writer will include a line with an available description for each of the fields.

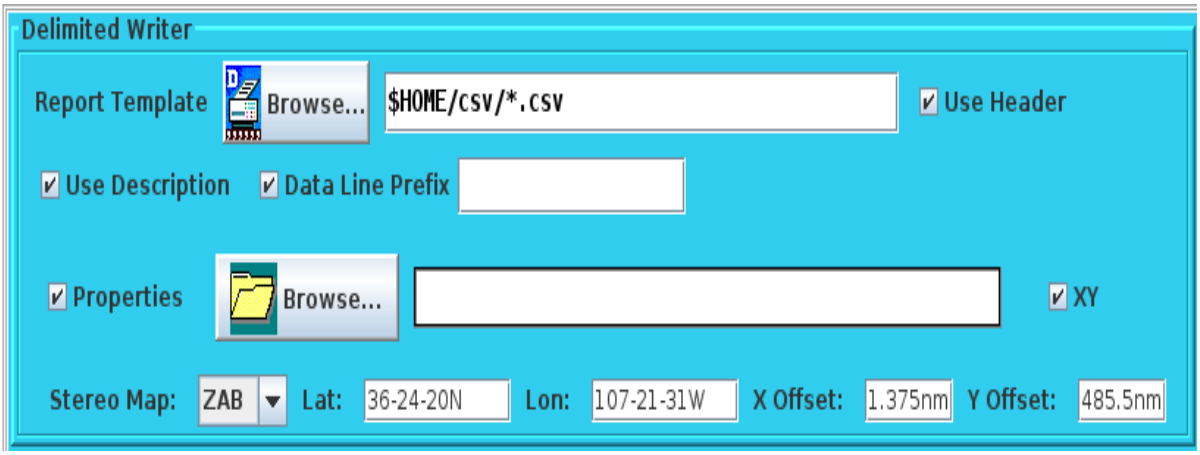


Figure 77

If the "Data Line Prefix" box is checked than the user can specify a prefix in the field provided. This Prefix is added to the data at beginning of all lines in the output file. If "Data Line Prefix" box is checked and there is no text in the "Data Line Prefix" field then the defaults of data run, and name are used. Otherwise, User Defined# is used where # is a number. Separate multiple prefixes in the field by a comma (","). If desired, a properties file to specify the units of the output fields can be specified via the checking the "Properties" check box and specifying a properties file to use in the field provided. The format of a Delim Properties file is "<field name>=<unit ID>". Below is an example Delimited Writer properties file.

```
IAS=Knots
TAS=Knots
Lat=deg
Lon=deg
Alt=ft
AltRate=FtPerMin
Hdg=deg
TurnRate=DegPerSec
TotalWeight=lbs
```

If XY-coordinates are desired instead of latitude/longitude, the XY box should be checked. In addition, using XY-coordinates requires the specification a stereographic point of tangency and XY offsets.

5.4.3 Flight Plan Writer

The Flight Plan Writer is a special-use writer that generates the flight plan file that was used to define the initial characteristics of the aircraft in a simulation. If the file name given ends with an .fp extension then a comma separated flight plan is written out. If no valid extension is given or the file ends with an .fpx extension, then a TGF XML Flight Plan is written.

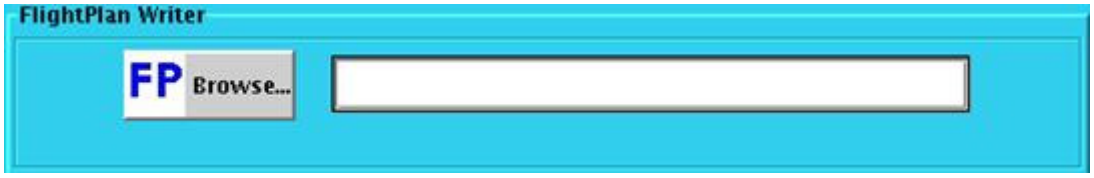


Figure 78

5.4.4 Sim Event Writer

The Sim Event Writer is a special-use writer that takes the Sim Pilot (pseudo-pilot) commands entered during the simulation and converts them to a SimEvent file. A SimEvent file is an XML file read by the TGF simulator containing pre-prepared Sim Pilot commands to automate actions taken by the aircraft. If "Remove Commands From Route" is checked than commands that were issued from an Aircraft's route are filtered out. If "Remove Unsuccessful Commands" is checked then failed commands are filtered out.

Figure 79

5.4.5 Plot Generator XML Writer

The Plot Generator creates a XML file that can be used as an input into the Berkeley plotting tool called Ptplot (http://ptolemy.eecs.berkeley.edu/java/ptplot), comparing pre-selected field values to each other. This writer is very similar to the XY Plotter in capabilities, except that the XY Plotter actually displays the plot created, while the Plot Generator creates a Ptplot input file that can be used if the plot should not displayed at the time it is created or if the plot is to be viewed multiple times.

The Plot Generator needs an input file describing the variables that are to be used for the x and y-axes of the plot; the input file is in XML-format and is described by the XSD description in: faa\tg\dra\gui\config\plotXml\plotter.xsd. The input XML file can be edited, if necessary. The color to use for the plotted points can be specified in case multiple XML plot files are to be imported into one Ptplot display, so that the different inputs can be distinguished. "Plot color" allows a specific color to be used to plot data. Specify Offset allows the Plot Generator to modify the values stored for display purposes, to add a fixed spacing to the x-coordinate if there is a break in the x-coordinate sequence. This can be useful when comparing certain types of repeated sequences within a plot. If "Connect Points" is checked then the points on the plot will be connected. The style of the point used to mark a data point can be specified using the "MarkStyle" choice box which allows the following specifications:

- **Various** – use various shapes to mark a data point on the plot.
- **Pixels** – use a very small dot (a single pixel) to mark a data point on the plot.
- **Points** – use a slightly larger dot (about a two by two pixel box) to mark a data point on the plot.
- **Dots** – use a slightly larger dot (about a four by four pixel box) to mark a data point on the plot.
- **None** – use nothing to mark a data point on the plot

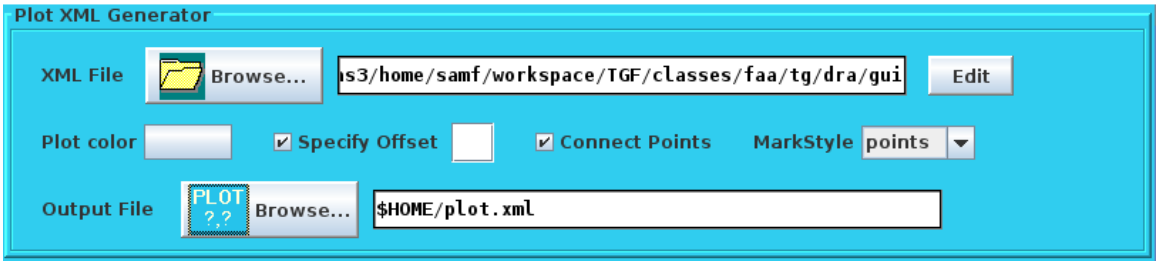


Figure 80

5.4.6 Sectorizing Writer

The Sectorizing Writer collates the data objects it receives by sector and writes each set of sector information to separate output files. The output filenames of the sector-separated files is the specified template name with the sector name inserted before the filename extension. The type of writer selected in the panel determines the type of the output files generated: the Text Writer selection will write the data objects as text, and the Delimited Writer selection will write the data as comma-separated values.

Figure 81

5.4.7 Sp Assign File Writer

The SpAssignFile Writer is a special-use writer that listens for successful assign command results and places them into an XML format. These files are in the format that the SimPilot Manager is expecting. The purpose of this object is to ensure that the pilots are assigned the same aircraft they were in the recording file in future runs.

Figure 82

5.4.8 Aircraft 4D Position Writer

The Aircraft 4D Position Writer is a special-use writer that listens for Aircraft updates and generates four-dimensional information which is saved in an XML file. This file can be loaded into a TGF's JPVD.

Figure 83

5.4.9 KML Writer

The KML Writer is a special-use writer that takes Aircraft updates and generates position information which is saved in a KML file. This file can be loaded into Google Earth ™.

Figure 84

5.5 The Plotters

The plotters open a window containing a plot (using the Berkeley Ptolemy II Ptplot tool: http://ptolemy.eecs.berkeley.edu/java/ptplot) of the relationship of two variables to each other. Either a writer or a plotter should be the last object in the DRAT tool configuration workspace, because the other tools do not generate an output format.

5.5.1 XY Plotter

The XY Plotter creates a plot window (using the Berkeley Ptplot tool) that compares pre-selected field values to each other. This plotter is very similar to the Plot Generator XML Writer in capabilities, except that the XY Plotter actually displays the plot created, while the Plot Generator creates a Ptplot input file to display independently of its creation (e. g., for a plot that should not be displayed when it is created or for a plot that will be viewed multiple times).

The XY Plotter needs an input file describing the variables that are to be used for the x- and y-axes of the plot; the input file is in XML-format and is described by the XSD description in: faa\tg\dra\gui\config\plotXml\plotter.xsd. The input XML file can be edited, if necessary.

Figure 85

6 The DR&A Objects

A data object is a set of data that describes one feature of a simulation. The data objects recorded by TGF encapsulate details about the simulation that are designed to be easily manipulated by the DRAT toolkit, whether by selecting the data objects of interest to the analysts or by extracting data for a summary. Data objects recorded by the simulator are described in this section, plus some data objects constructed by the DRAT tools that describe aspects of the simulation not directly recorded. The data objects indicated by an asterisk (*) are those constructed by a DRAT factory tool.

Ac Event* – a data object created by the Event File Combiner Factory.

Aircraft Accessor – a data object containing state information about an aircraft at a specific second. Here is an example of the Text Writer output format for Aircraft Accessor:

```
AIRCRAFT: UAL466  Time: 00:03:13  AC type: A320  Start time: 00:00:05
  Bcn: 2174  Sector: NORTH_ARR  Freq: 128.400  SP: NO_SPW  FS: ILS_BEF_FINL
  Lat: 39-45-04.519N  Long: 075-48-28.184W  Alt: 7788.7 ft  Hdg: 74.69501 deg
  TAS: 279.482  IAS: 249.998 knots  Alt rate: -0.565 ft/m  TurnR: 0.086 deg/s
  Filed: WINGO.NUGGY[CMD=CLA]..PHL
```

- Time – current simulation time (0:00:01 is the start of the simulation) in HH:MM:SS
- Bcn – beacon code
- Start time – simulation time at which the aircraft became active in the simulation
- FS – flying status: current phase of navigation of the aircraft. For a list of possible flying statuses see Section 5.2.6 Flying Status Filter.
- Alt rate – rate of change in altitude: positive is climbing, negative is descending
- Turn rate – rate of change in heading: positive is turning right, negative is turning left
- Filed – the filed flight plan of the aircraft

Additional aircraft dynamics information that is available on request is: desired altitude, desired heading, desired IAS, and desired roll rate.

Aircraft Type Profile – a data object that contains information about an aircraft's type.

Airport – contains airport information.

Altitude Speed Error* – an object created by the Altitude and Speed Error Factory that contains second by second information about the differences between aircraft's current altitude/indicated airspeed/mach/altitude rate and the aircraft's desired altitude/indicated airspeed/mach/altitude rate. Here is an example of the Text Writer output format:

```
ALT N SPD ERROR:   Acid: UAL228  Time: 00:19:32.2
  Alt Error: -0.014440744674239673ft
  Alt Rate Error -0.10525156569567046ftPerMin
  IAS Error: -1.1466505900807139E-4kts  Mach Error: -
2.100923101044927E-7Mach
```

Approach Pullout* – a data object created by the Approach Pullout Factory which marks the cancellation of a landing clearance. Either through command cancellation or through a non-landing approach clearance that never received a final clearance.

Approach Pullout Question* – a data object created by the Approach Pullout Factory which marks a possible approach pullout.

At Maneuver Altitude – a data object marking when an aircraft taking off from its departure maneuver altitude.

Bad Match* – a data object created by Sim Diff Utility: describes the differences between equivalent objects (of the same type that occur at the same simulation time) from two comparable recording files for Verification and Validation.

Distance Flown Between Fixes* – a data object created by the Distance Flown Between Fixes Factory when the user selects to pass individual information through, contains per second information about the distance an Aircraft has flown between two fixes.

Distance Flown Between Fixes Summary* – a data object created by the Distance Flown Between Fixes Factory which contains summary information about the distance an Aircraft has flown between two fixes.

Distance Second* – a data object constructed by the Distance Factory containing distance information derived from the positions of an aircraft and another object. A sample of the Distance Second text output produced by Text Writer consists of:

```
Time: 00:22:19 Distance: 2.79006 nm Horizontal dist: 2.7693 nm Risk API: 0.0%
```
Ac1: AWE179 Lat: 39-58-26.368N Long: 084-48-30.606W Alt: 30980.2 ft Sector: 98

Ac2: N885Q Lat: 39-57-35.232N Long: 084-45-05.074W Alt: 29035.9 ft Sector: 88

Time – time the distance measurement was made
Distance – slant distance from the aircraft to the object
Horizontal distance – distance between the aircraft not including altitude differences
Risk API – aircraft proximity index (risk measurement)
Ac1 – ACID, position, and sector of the first aircraft (paired alphabetically)
Ac2 – ACID, position, and sector of the second aircraft

Distance Summary* – a data object constructed by the Distance Summary Factory that contains a summary of distance information. Here is an example of the Text Writer output format:

```
DIST SUMMARY.
  DURATION: 00:02:04.6  Start time: 00:08:54.8  End Time: 00:10:58.4
  Name: UAL236_UAL857
  1ST VIOLATE_SEP: UAL236_UAL857  Time: 00:08:54.8  Distance: 3.0 nm
  Horizontal dist: 3.0 nm  Vertical dist: 2.24 ft  Risk API 0.01%
    Ac1: UAL236    Lat: 30-06-19.671N  Long: 95-34-31.851W  Alt:
5998 ft  Sector: WestArrival
    Ac1: UAL857    Lat: 30-08-46.941N  Long: 95-32-32.418W  Alt:
6000.2 ft  Sector: WestArrival
  VIOLATE_SEP: UAL236_UAL857  Time: 00:10:58.4  Distance: 1.4 nm
  Horizontal dist: 1.4 nm  Vertical dist: 2.22 ft  Risk API 2818.45%
    Ac1: UAL236    Lat: 30-06-21.25N  Long: 95-25-15.345W  Alt: 6000
ft  Sector: WestArrival
    Ac1: UAL857    Lat: 30-06-21.359N  Long: 95-23-38.269W  Alt:
5997.8 ft  Sector: WestArrival
  CPA: VIOLATE_SEP: UAL236_UAL857  Time: 00:09:37  Distance: 1.12 nm
  Horizontal dist: 1.12 nm  Vertical dist: 1.81 ft  Risk API
3912.54%
    Ac1: UAL236    Lat: 30-06-20.619N  Long: 95-31-13.153W  Alt:
5987.3 ft  Sector: WestArrival
    Ac1: UAL857    Lat: 30-06-32.346N  Long: 95-29-56.877W  Alt:
5989.1 ft  Sector: WestArrival
```

DR&A Count* – a data object constructed by the Data Object Count Factory containing totals and interval counts of data objects received. Contains the interval of time the objects were counted for, the total counted to this point, the total for the current interval, and the interval number.

```
DRA COUNT. Name:   00:00:00 - 00:19:32  Total: 43  Interval Subtotal
43
  Interval: # 1  Class Instance: faa.tg.dra.attributes.Flyable
```

Duration Ac* – a data object created by the Aircraft Field Duration Factory contains more Duration Second information about the duration second information about an aircraft. See Duration Second for more information.

Duration Second* – a data object constructed by the Duration Factory containing duration information on a sequence of one type of data object. Duration contains the start time of the consecutive states, the end time, the first event of the sequence, and the last event of the sequence. Here is an example of the Text Writer output format:

```
DURATION: 00:03:33.2  Start time: 00:16:00  End Time: 00:19:32.2
Name: SWA227
  1ST AIRCRAFT: SWA227  Time: 00:16:00  AC type: B737  Start time:
00:16:00  Bcn: 7654
  GSector: N/A  Sector: WestArrival  Freq: 124.350  SP: N/A  FS:
ON_ROUTE
  Lat: 30-38-15.769N  Long: 96-03-23.669W  Alt: 12000 ft  Hdg:
137.78271 deg
  TAS: 332.3 kts  IAS: 280 kts  Mach: 0.52 Mach  Alt rate: -0
ftPerMin
  TurnR: 0.01 degPerSec  Roll: 0.167 deg  Grd hdg: 137.8 deg
  Grd spd: 332.34 kts  Flap: Cruise
  Des Alt: 12000 ft  Des Hdg: 137.78 deg  D IAS: 280 kts  D Roll:
0.0 deg
  M Alt: 12000 ft  M IAS: 280 kts  M Mach: 0.5245 Mach  M AltR: 0.0
ftPerMin
  FPA: -0.0 deg  CL: 0.38872  Thrust: 45512 newt  RteRemain: 48.3 nm
  SpdAltMan: CrossMan(280kts; FL120 to 32.14 nm from LYYTE; 210kts @
FL060)
  LateralMan RteFollMan(BAZBL..LYYTE)  ArrRwy: N/A  DepRwy: N/A
  Filed route: BAZBL:K4[cmd=X LYYTE A060 S210]..LYYTE:K4..GRRAM:K4
  Route: BAZBL..LYYTE..GRRAM
  AIRCRAFT: SWA227  Time: 00:19:32.2  AC type: B737  Start time:
00:16:00
  Bcn: 7654  GSector: N/A  Sector: WestArrival  Freq: 124.350  SP:
N/A
  FS: ON_ROUTE  Lat: 30-23-54.138N  Long: 95-48-20.712W  Alt: 9987.4
ft
  Hdg: 137.78259 deg  TAS: 303.7 kts  IAS: 263 kts  Mach: 0.48 Mach
  Alt rate: -92 ftPerMin  TurnR: 0.0 degPerSec  Roll: 0.0 deg
  Grd hdg: 137.8 deg  Grd spd: 303.71 kts  Flap: Cruise
  Des Alt: 9987 ft  Des Hdg: 137.78 deg  D IAS: 250 kts  D Roll: 0.0
deg
  M Alt: 9987 ft  M IAS: 250 kts  M Mach: 0.4758 Mach  M AltR: 0.0
ftPerMin
  FPA: -0.172 deg  CL: 0.43692  Thrust: 11995 newt  RteRemain: 29 nm
  SpdAltMan: CrossMan(280kts to 8.75 nm from LYYTE; 210kts @ FL060)
  LateralMan RteFollMan(BAZBL..LYYTE)  ArrRwy: N/A  DepRwy: N/A
  Filed route: BAZBL:K4[cmd=X LYYTE A060 S210]..LYYTE:K4..GRRAM:K4
  Route: BAZBL..LYYTE..GRRAM
```

Dynamics Change – defines a data object that marks when an aircraft switches from using ground dynamics to air dynamics to move the aircraft or visa versa.

End of Epoch – records an update of the simulation time (adds one second).

End of Route – defines a data object that marks when an aircraft has reached the end of its current route.

Exercise Ready – defines a data object that marks when the simulation was ready to run.

Fix – Defines an object containing fix information, including Waypoint and VORTAC.

Flight – contains initial information on a flight of one or more aircraft following a single flight plan that has been added to the simulation. Flight contains the aircraft ID, the start time, the starting frequency, and the filed flight plan.

Flight Activated – defines an object containing information about a flight going from a pending state to an active state. This contains the flight initialization data sent to a SimPilot Workstation (SPW) when the flight was assigned to an operator.

Flight Terminated – defines an object containing information about a flight that goes from an active state to a terminated state.

Flying Status Change – records the change of a flight's status or phase of flight.

Frequency Change – records the change of the frequency used by a flight. A Frequency Change contains the aircraft ID, the simulation time, the aircraft type, the new frequency, the old frequency, and the location of the change.

Fuel Burn* – a data object created by the Fuel Burn Factory.

Geo Sector – a data object marking the geographical boundary of a sector. For more information see Sector.

Geo Sector Info* – a data object created by Geo Sector Counter Factory which contains information about the number of aircraft found during a given interval in a Geo Sector.

Ground Factory Arrival Data* – a data object created by the Ground Factory which contains information about arriving Aircraft.

Ground Factory Departure Data* – a data object created by the Ground Factory which contains information about departing Aircraft.

Ground Factory Statistics* – a data object created by the Ground Factory which contains statistical information about arrivals, departures, and other ground operations.

Ground Fix Connection – a data object marking one way connection between to fixes on the ground.

Ground Route Type – a data object marking the ground route as one of the following types:

1. **EXIT** – a ground route that can be used to taxi off of a runway
2. **PROPOSED EXIT** – a planned exit that should not be used to taxi.
3. **CLOSED EXIT** – an exit that is closed and therefore can not be used to taxi off a runway.
4. **GATE** – a route that can be used to taxi to a terminal gate
5. **PROPOSED GATE** – a planned gate that should not be used to taxi.
6. **CLOSED GATE** – a gate that is closed and therefore can not be used.
7. **RUNWAY** – a route that marks a runway.
8. **PROPOSED RUNWAY** – a route that marks a planned runway.
9. **CLOSED RUNWAY** – a route that marks a runway that is closed and therefore can not be used movement.
10. **TAXI** – a taxiway that can be used for ground movement.
11. **PROPOSED TAXI** – a planned taxiway that should not be used to do ground movement.
12. **CLOSED TAXI** – a closed taxiway that can not be used for ground movement.
13. **TERMINAL** – a ground route that is in the terminal area of an airport that can be used for ground movement.
14. **PROPOSED TERMINAL** – a planned ground route that is in the terminal area and should not be used for ground movement.
15. **CLOSED TERMINAL** – a closed ground route in the terminal area and therefore can not be used for ground movement.

Ground Speed Track Data* – a data object generated by the Ground Speed Factory which contains information about the TGF ground speed of an aircraft versus the calculated ground track speed of an aircraft.

Handoff Accept* – data object created by the HFL Handoff to Boundary Filter which records when the handoff of an aircraft was accepted by a controller. Handoff Accept contains the aircraft ID, the sector ID, and the Simulation time.

Heading Captured – recordings when an Aircraft captures its current desired heading.

Heading Changed – recordings when an Aircraft changes its current desired heading.

HFL EnRoute Summary* – data object created by HFL EnRoute Summary Factory contains a summary statistics of measures involving the simulation complexity for a sector over intervals of time. The data contained includes several types of violations: standard separation violation (report abbreviation: secnf), a user defined separation violation (ecnf), between sector standard violations (bscnf), and No Transgression Zone (NTZ) area boundary violations (ascnf); number (N) and duration (D) of these outputs are provided, along with hold delays (htdly), takeoff delays (stdly), along with aircraft handled (hand), aircraft completed (comp), aircraft handed off (hoff), and other information. An example of the HFL EnRoute Summary text output produced by Text Writer is:

```
HFL ENROUTE. Date: 2003-06-03  Condition:   Subj#: s00  Sector: NORTH_DEP
  Interval: 600-1199  Nsecnf: 4  Dsecnf: 274  Necnf: 3  Decnf: 167
  Nbscnf: 36  Dbscnf: 1188  CPA: 6729 ft  Horiz CPA: 6728 ft  Vert CPA: 107 ft
  API: 31.7  Nascnf: 0  Dascnf: 0  CMAV: 9.08  Alt cmds: 34  Hdg cmds: 0
  Spd cmds: 0  Nhtdly: 0  Dhtdly: 0  Nstdly: 0  Dstdly: 0  Nptt: NA
  Dptt: NA  Nhand: 13  Dhand: 6169  Dist flown: 476.9 nm  Ncomp: 0  Nhoff: 0
```

HFL Ground Duration* – data object created by HFL Ground Factory contains information about the following durations:

1. **Taxi time in** – the time from when an aircraft touches down on its arrival runway to when it is terminated out of the simulation.
2. **Taxi time out** – the time from aircraft's first movement on the ground to when it takes off from its departure runway.
3. **Initial Delay** – the time from when an aircraft on the ground is first generated to when its first ground movement occurs (only applies to departing ground aircraft).

The following information is generated about each duration:

1. Whether the duration relates an initial delay, taxi time out, or taxi time in.
2. The ID of the aircraft the duration is for
3. The length of the duration
4. The Simulation Time of the start and end of the duration.

HFL Ground Summary* – data object created by HFL Ground Factory contains the following summary information about a ground simulation:

1. The total number of arrivals.
2. The total number of departures.
3. The minimum delay to report.
4. The total number of aircraft with a delay time, taxi time out minus minimum report.
5. The System Time of the start and end of the simulation
6. The Simulation Time of the start and end of the simulation

HFL Sp Command* – data object created by HFL Ground Factory contains the total number of times a certain commands issued during a ground simulation including Heading, Speed, Missed Approach, and Taxi. The totals are separated into four groups:

1. **All** – commands issued from any source.
2. **Datalink** – commands issued either from Datalink equipment or a Datalink message.
3. **SPW** – commands issued from a TGF SimPilot Workstation (SPW).
4. **Total Datalink & SPW** – the total number of commands issued from either Datalink or from an SPW.

Initial Taxi Start – a data object marking when an Aircraft on the ground has started to taxi for the first time. Only applies to departing ground aircraft.

Metering Distance Second* – a data object generated by the Runway Metering Factory and the Fix Metering Factory if the Pass Individual is chosen. This object contains per second information about Arrival Runway/Fix metering.

Metering Statistic* – a data object created by the Runway Metering Factory and the Fix Metering Factory. For the Runway Metering Factory the object contains information about the spacing of a pair of Aircraft where the Lead Aircraft is an Aircraft that just crossed its approach runway's threshold and the Aircraft closes behind it on the same approach. For the Fix Metering Factory the object contains information about the spacing of a pair Aircraft where the Lead Aircraft is an Aircraft that just crossed the Fix and the Aircraft closes behind it heading towards the Fix.

Message – a scenario status message or alert. The types of message are:

- *Info Message* – status message on the state of the scenario.
- *Warning Message* – alert of an unexpected occurrence in the simulation, which may or may not indicate a problem.
- *Error Message* – report of a problem in the simulation, which may affect the validity of the simulation.

Missed Approach – a data object marking when a landing aircraft has executed a missed approach.

Near Fix* – a data object generated by the Near Fix Count Factory if the Pass Through Individual is chosen. It contains information about the objects counted in Near Fix Count.

Near Fix Count* – a data object generated by the Near Fix Count Factory that contains information about the number of Aircraft that pass over or go near a fix.

On Localizer – a data object marking when an aircraft on approach to land on a runway is on that approach's localizer.

Over Route Node – a data object marking when an aircraft is over a fix/waypoint on its current route.

Passed Outer Marker – a data object marking when an aircraft on approach land on a runway has passed that approach's outer marker.

PTT Recordable* – an object that indicated a controller or pilot microphone has been keyed on or off (Push-to-Talk). It is created by the PTT Reader from Push to Talk Data.

PTT Statistic* – an object that is created by the PTT Duration Factory containing durations that microphones were keyed during controller/pilot communications.

Recordable Data – an object that is used to store any data not stored elsewhere.

Route – a data object that defines a Jet route, a SID route, or a Victor route.

Route Captured – a data object marking an aircraft's transition to following a route.

Route Deviation Second* – a data object created by the Route Deviation Factory if the user chooses to pass through individual information. This data object contains a second of information about when an aircraft deviated from a route more than an acceptable distance.

Route Deviation Summary* – a data object created by the Route Deviation Factory contains summary information about when an aircraft deviated from a route more than an acceptable distance.

Run Data Factory* – a data object generated by the Run Data Factory which contains information about how long a simulation ran.

Runway – defines a data object containing information about a runway.

Scenario State – contains information about the scenario that the simulation runs including the flight plan, audio file, and event files used during the simulation.

Scenario Start State – contains information about the setup and environment of the simulation scenario.

Sector – contains information about a NAS sector of the simulation. Unless geographic sector boundaries were specifically provided to the TGF simulator for a recording, the sector's physical location is not known, and sector fields in other data objects will correspond to the aircraft's frequency.

Sid Route – defines an object containing Standard Instrument Departure (SID) route information.

Sim Event State – a data object marking the condition of a Sim Event fired during the simulation. The Sim Event State is used primarily to create Sim Event XML files.

Sim Paused – a data object marking when a simulation was paused.

Sim Terminated – a data object marking the end of a simulation.

Sp Command Count*- a data object created by the Sp Cmd Count Factory that contains information about the number of a given type of command received from a given source in a given Sector. Here is an example of the Text Writer output format:

```
SpCmdCount  Source: Route  Sector: WestArrival  Cross  Count 16
```

Sp Command Result – a data object containing information about a command entered by a SimPilot (pseudo-pilot) and the result of the command.

Sp Command Location* – data object created by the Sp Cmd Location Factory contains information on where an Aircraft was when it executed a given SimPilot Command.

Sp Train Record Data* – a data object created by the Sp Train Factory contains data about an individual record of a SP Training Scenario.

Sp Train Scenario Data* – a data object created by the Sp Train Factory contains statistical information about a SP Training Scenario.

Spw Statistics* – a data object created by the SPW Statistics Factory that contains statistical information about a SimPilot Workstation (SPW) used in a simulation.

Star Route – defines an object containing Standard Terminal Arrival (STAR) route information.

Takeoff Start – a data object marking the time an aircraft starts to takeoff from its departure runway.

Touchdown – a data object marking the time an aircraft touched down on the runway.

Terminal Airport Summary* – data object created by Terminal Simulation Factory contains a summary statistics of measures involving the simulation complexity for an airport over intervals of time. The data contained includes: the airport ID, the time interval in seconds, the number of departures, the number of delayed departures, the cumulative delay of departures, the number of gate holds and releases, the cumulative duration of the gate holds, the average time between departures, and the average time between landings. An example of the Terminal Airport summary is:

```
TERM AIRPORT: PAR  Interval: 600 - 1199  NDept: 12  NDptDly: 1  DDptDly: 50
  NGateHolds: 1  NGateReleas: 1  DGateHolds: 30  AvDeptTime: 180  AvLandTime: 0
```

Terminal Summary* – data object created by Terminal Simulation Factory contains a summary statistics of measures involving the simulation complexity for a sector over intervals of time. The data contained includes several types of violations: standard separation violation (report abbreviation: stcnf), a user defined separation violation (tcnf), between sector standard violations (bscnf), No Transgression Zone (NTZ) area boundary violations (ascnf), longitudinal conflicts (lcnf), and parallel conflicts (pcnf); number (N) and duration (D) of these outputs are provided, along with aircraft handled (hand), aircraft completed (comp), aircraft handed off (hoff), and counts of pilot commands.

A sample of the Terminal Summary text output produced by Text Writer consists of:

```
TERM SIM. Date: 2003-06-03  Condition:   Subject #: s00  Sector: 78
  Interval: 600-1199  Nstcnf: 3  Dstcnf: 141  Ntcnf: 0  Dtcnf: 0
  Nbscnf: 7  Dbscnf:  301  CPA:   Horiz CPA:   Vert CPA:
  API: 0  Nascnf: 1  Dascnf: 21  CMAV: 4.63  Alt cmds: 13  Hdg cmds: 1
  Spd cmds: 1  Nlcnf: 0  Dlcnf: 0  Npcnf: 0  Dpcnf: 0
  Nhand: 70  Dhand: 39056  Dist flown: 3637.4 nm  Ncomp: 41  Nhoff: 8
```

7 DRAT Report Design Descriptions

These report design descriptions are provided to explain how certain frequently requested reports are generated using the DRAT tools.

The variables in the reports that follow will be described in as much detail as necessary or additional documents will be cited as references. Variable names are arbitrary and may or may not have been used in previous research efforts. Variable concepts, however, have for the most part been employed in earlier work. Once a concept is explained, such as the principle of accumulating time duration of conflicts, it may or may not be repeated in similar variable descriptions.

7.1 Conflict Reports

Conflict reports are reports of separation violation between pairs of aircraft. "Conflicts" are not the same as the conflict alert warnings produced by NAS for controller assistance. Conflict reports include an Aircraft Proximity Index (API) calculation. The API is a measure of conflict severity developed by Mr. Lee Paul of the FAA Technical Center. Conflict report output also states the horizontal and vertical separations between the aircraft. All conflict variables assume a technical violation of minimum separation between pairs of aircraft flying in controlled airspace.

7.1.1 Standard Conflict (SCNF)

For safety reasons, aircraft should maintain a horizontal distance of at least 5 nautical miles (nm) from each other. The vertical safe distance depends on the altitude of the aircraft. For an altitude of less than 29,000 feet, the vertical separation minimum is 1,000 feet. For altitudes greater than 29,000 feet, the vertical minimum increases to 2,000 feet. If two aircraft come within the horizontal and the vertical restriction of each other, they are in separation violation.

The best DRAT tool sequence to produce this report is: Recordable Reader, Distance Factory with Violation Separation Type, and either Text Writer or Delimited Writer. Data objects are imported from the TGF recording file by Recordable Reader, which sends them to the Distance Factory. The Distance Factory should be set to VIOLATE_SEP, have Pass Through turned off, have the minimum distance setting of 5 nm, and have the minimum altitude setting of -1 feet. The altitude setting of -1 feet indicates a standard conflict, causing the filter to use the two altitudes of 1,000 feet below 29,000 feet and 2,000 feet above 29,000 feet. The type of writer determines the type of output, and the file name specified is the output file. One data object per separation violation will result.

7.1.2 Standard Conflict Duration (SCNFD)

The duration of the standard conflicts as reported by the SCNF process in Section 7.1.1, over intervals of the simulation.

The DRAT tool sequence for this report is: Recordable Reader, Distance Factory, Data Object Count Factory, and either Text Writer or Delimited Writer. The parameters for the Distance Factory should be set to VIOLATE_SEP, have Pass Through turned off, have the minimum distance setting of 5 nm and have the minimum altitude setting of -1 feet to indicate a standard conflict (see Section 7.1.1). The Data Object Count Factory should specify the interval desired by the user (or a very high number so one interval encompasses the entire length of the simulation), with Count Name Once turned on so that violations spanning more than one interval are not counted more than once, and no value for Classname and Name.

If number and duration of conflicts per interval per sector is desired, this DRAT tool sequence can be used: Recordable Reader, HFL EnRoute Factory (or Terminal Simulation Factory, if for terminal airspace), and either Text Writer or Delimited Writer.

7.1.3 X-Value Conflict (XCNF)

This measure allows a user specified input of data instead of the standard separation values.

The DRAT tool sequence for this report would be the same sequence used for the SCNF process in 7.1.1; Recordable Reader, Distance Factory with Violation Separation Type, and either Text Writer or Delimited Writer. The only panel parameters that would differ are the Distance Factory Minimum Distance and Minimum Altitude values, which would instead be set to the values desired by the user.

7.1.4 X-Value Conflict Duration (XCNFD)

This is the cumulative duration for XNCF. The cumulative duration is then recorded in time blocs for examination after the simulation has concluded.

The DRAT tool sequence for this report would be either one of the tool sequences that were given for the SCNFD process in 7.1.2; with the parameters only changed in that the minimum distance and altitude would be values selected by the user.

7.1.5 Wake Vortex (Longitudinal) Conflict (LCNF)

When aircraft enter the designated region known as the terminal area, they must observe a change in the separation minima. The horizontal separation minimum decreases from 5 nm to 3 nm, while the vertical minimum remains at 1,000 feet. The significant difference is the addition of wake vortex separation restrictions when an aircraft is on a final approach sequence. Wake vortexes are produced by aircraft wings disrupting the airflow

behind the aircraft; details are defined in 7110.65T. Standard separation is 3 nm, unless the wake vortex criteria apply. The criteria of the wake vortex takes into account the type of aircraft, size, and overall weight.

The DRAT tool sequence for this report is: Recordable Reader, Distance Factory with Violation Separation Type, and either Text Writer or Delimited Writer. Data objects are imported from the TGF recording file by Recordable Reader, which sends them to the Distance Factory. The Distance Factory should be set to VORTEX_SEP with Pass Through turned off. The type of writer determines the type of output, and the file name specified is the output file. If Distance Factory with Violation Separation Type is used, one data object per separation violation will result.

7.1.6 Wake Vortex Conflict Duration (LCNFD)

The duration of the wake vortex (longitudinal) conflicts as reported by the LCNF process in 7.1.5, over intervals of the simulation.

The DRAT tool sequence for this report is: Recordable Reader, Distance Factory, Data Object Count Factory, and either Text Writer or Delimited Writer. The parameters for the Distance Factory should be set to VORTEX_SEP and have Pass Through turned off. The Data Object Count Factory should specify the interval desired by the user (or a very high number so one interval encompasses the entire length of the simulation), with Count Name Once turned on so that violations spanning more than one interval are not counted more than once, and no value for Classname and Name.

If number and duration of conflicts per interval per sector is desired, this DRAT tool sequence can be used: Recordable Reader, Terminal Simulation Factory, and either Text Writer or Delimited Writer.

7.1.7 Parallel Conflict (PCNF)

This measure is implemented in order to evaluate conflicts that result when aircraft approaching the airport are on a simultaneous parallel approach vector. A simultaneous approach occurs when two aircraft are side-by-side on final approach to parallel runways. The data must be user-specified, since it is only used to examine the possibility of an accident.

The DRAT tool sequence to produce this report is: Recordable Reader, Altitude Filter, Distance Factory with Violation Separation Type, and either Text Writer or Delimited Writer. Data objects are imported from the TGF recording file by Recordable Reader, which sends them to the Altitude Filter. The Altitude Filter's minimum altitude is set to 0 feet and the maximum altitude is set to the maximum altitude to track the aircraft on final approach at. The Distance Factory should be set to VIOLATE_SEP, have Pass Through turned off, have a minimum distance setting slightly greater than the distance of the parallel runways, and have a minimum altitude setting of 500 feet. The type of writer determines the type of output, and the file name specified is the output file. If Distance

Factory with Violation Separation Type is used, one data object per separation violation will result.

7.1.8 Parallel Conflict Duration (PNCFD)

The duration of the standard conflicts as reported by the PCNF process in Section 7.1.7, over intervals of the simulation.

The DRAT tool sequence for this report is: Recordable Reader, Distance Factory, Data Object Count Factory, and either Text Writer or Delimited Writer. The parameters for the panels are the same as in the above PCNF process in Section 7.1.7, with the addition of the Data Object Count Factory with the interval desired by the user (or a very high number so one interval encompasses the entire length of the simulation), with Count Name Once turned on so that violations spanning more than one interval are not counted more than once, and no value for Classname and Name.

If number and duration of conflicts per interval per sector is desired, this DRAT tool sequence can be used: Recordable Reader, Terminal Simulation Factory, and either Text Writer or Delimited Writer.

7.1.9 Restricted Airspace Conflict (ASCNF)

Restricted airspace is a defined area in which the flight of aircraft is restricted in accordance with special conditions. This measure collects the frequency of aircraft deviations into the restricted airspace. To allow flexibility, the user can specify the boundary and enter it into the software.

The DRAT tool sequence for this report is: Recordable Reader, Geographic Area Filter, Data Object Count Factory, and either Text Writer or Delimited Writer. A Geographic Area Filter is used to determine all the instants at which an aircraft is within the boundaries of the given restricted zone. The Data Object Count Factory is set to count names once, so every instant of airspace violation is not counted separately, to determine the frequency.

7.1.10 Restricted Airspace Conflict Duration (ASCNFD)

The cumulative durations of the conflicts reported by the ASCNF process in Section 7.1.9 in subtotaled time blocks.

The DRAT tool sequence for this report is: Recordable Reader, Geographic Area Filter, Duration Factory, and either Text Writer or Delimited Writer. The parameters for the panels are the same as in the above ASCNF process in Section 7.1.9, with the addition of the Duration Factory with minimum duration of zero and maximum duration a high number.
If number and duration of conflicts per interval per sector is desired, this DRAT tool sequence can be used: Recordable Reader, HFL EnRoute Factory (or Terminal Simulation Factory, if for terminal airspace), and either Text Writer or Delimited Writer.

7.2 Complexity Measurement Reports

All the following complexity measurement reports are available in counts per sector, per interval using the following configuration: Recordable Reader, HFL EnRoute Factory (or Terminal Simulation Factory, if for terminal airspace), and either Text Writer or Delimited Writer. The intervals for the factory will need to be set.

7.2.1 System Activity (CMAV)

This is a measure of the average number of aircraft within a certain distance of each other. The software allows manual input of the distance between the aircraft. The typical test number is 10 nm. The sampling rate of data is taken once every 10 seconds.

7.2.2 Altitude Change Command (ALT)

These reports include all messages sent from the controller to the aircraft advising the aircraft on altitude changes. The messages are counted over the simulation or for a specified time block.

7.2.3 Heading Change Command Report (HDG)

These reports include all messages sent from the controller to the aircraft involving heading instructions. They are counted over the entire run, or for a pre-specified period of time.

7.2.4 Speed Change Command Report (SPEED)

These reports include all messages sent from the controller to the aircraft involving speed instructions. They are counted over the entire run, or for a pre-specified period of time.

7.3 Non-Conflict Error Reports

7.3.1 Missed Approach Report (MISSAPP)

When an aircraft cannot complete an approach due to some event, it is called a 'missed approach'. In the simulation, the frequency of missed approaches is generated within the terminal control area. This area includes the primary airport and any satellite airport to which approaches are being controlled.

The DRAT tool sequence for this report is: Recordable Reader, Flying Status Filter, Data Object Count Factory, and either Text Writer or Delimited Writer. The flying status selected by the Flying Status Filter will be “MISSED_APPROACH” with the “Last instance of status” unchecked. The Data Object Count Factory will be set to the interval desired (or a very high number so one interval encompasses the entire length of the simulation), with Count Name Once turned on so that missed approaches spanning more than one interval are not counted more than once, and no value for Classname and Name.

7.3.2 Hold Report (NDLY)

This report measures the frequency and duration of hold messages that are sent to different aircraft. This value can be an indication of the complexity of a simulation or of the existence of other problems.

The DRAT tool sequence for this report is: Recordable Reader, Flying Status Filter, Data Object Count Factory, and either Text Writer or Delimited Writer. The flying status selected by the Flying Status Filter will be "HOLD" with the "Last instance of status" unchecked. The Data Object Count Factory will be set to the interval desired (or a very high number so one interval encompasses the entire length of the simulation), with Count Name Once turned on so that missed approaches spanning more than one interval are not counted more than once, and no value for Classname and Name.

If number and duration of conflicts per interval per sector is desired, this DRAT tool sequence can be used: Recordable Reader, HFL EnRoute Factory (or Terminal Simulation Factory, if for terminal airspace), and either Text Writer or Delimited Writer.

7.4 Activity / Task Load Reports

All the following complexity measurement reports are available in counts per sector, per interval using the following configuration: Recordable Reader, Terminal Simulation Factory, and either Text Writer or Delimited Writer. (All but the number of departures is also available using HFL EnRoute Factory instead of Terminal Simulation Factory). The intervals for the factory will need to be set.

7.4.1 Number of Flights Handled (NHAND)

This is the total number of flights that are handled by the controller for a given period of time. The report can be based on the entire simulation or on specified time blocks.

7.4.2 Number of Completed Landings (NCOMP)

This is the number of landings completed during final approach in a terminal environment. The report can be based on the entire simulation or on specified time blocks.

7.4.3 Number of Departures (NDEPT)

This is the number of departures completed by a controller in a terminal environment. The report is based on specified time blocks or the entire run of the simulation.

7.4.4 Number of Handoffs (NHOFF)

This is the number of successfully completed handoffs by the controller to adjacent sectors or facilities. It applies to both en route and terminal environments.

8 Glossary

ACID – Aircraft ID
ALT – HFL designation for a report on the frequency of altitude change messages sent from controller to aircraft.
API – Aircraft Proximity Index.
ASCNF – Restricted Airspace Conflict
ATC – Air Traffic Control.
ATWIT – Air Traffic Workload Input Technique.

BSCNF – Between Sector Standard Violations

CMAV – HFL designation for a report on the average number of aircraft within X miles of one another.
Configuration – a sequence of DRAT tools that operates on TGF simulator data to generate (at least) one set of output. (Some types of configurations can produce multiple output files containing different sets of output.) Each DRAT tool in the sequence operates on the simulator data resulting from the previous tool in the sequence, with a minimum of two tools needed to produce output (a reader and a writer).
CPA – the closest point of approach between two aircraft in separation violation.

Data Object – is a set of related information such as aircraft information, fix information, or pilot (pseudo-pilot) command information. A data object can be thought of as a record with multiple fields.
DASCNF – HFL designation for a report on the cumulative durations of "airspace conflicts", the frequency of aircraft entering restricted airspace.
DBSCNF – HFL designation for a report of the cumulative durations of between sector conflicts (separation violations).
DECNF – HFL designation for a report of the cumulative duration of EnRoute sector conflicts (separation violations) for separation distances that are user-specified.
DEPART – HFL designation for a report on the duration of departures in a terminal environment.
DHAND – HFL designation for a report on the duration of flights handled by the controller over a given period of time.
DHTDLY – HFL designation for a report on the duration of aircraft put in a holding pattern (to delay traffic) over a given period of time.
DLCNF – HFL designation for a report on the cumulative durations of longitudinal conflicts (separation violations of pairs of aircraft on final approach that are in-trail of one another).
DPCNF – HFL designation for a report on the cumulative durations of parallel conflicts (separation violations of pairs of aircraft in terminal airspace).
DPTT – HFL designation for a report on the duration of push-to-talks keyed by a controller over a given period of time.
DR&A – Data Reduction and Analysis.
DSECNF – HFL designation for a report of the cumulative durations of standard EnRoute sector conflicts (separation violations).

DSTCNF – HFL designation for a report of the cumulative durations of standard terminal airspace sector conflicts (separation violations).
DSTDLY – HFL designation for a report on the duration of gate hold delays between the scheduled and actual takeoff times over a given period of time.
DTCNF – HFL designation for a report of the cumulative duration of terminal airspace sector conflicts (separation violations) for separation distances that are user-specified.

ECO – Exercise Control Operator
ECNF – User defined Separation violation for EnRoute Airspace
EN – Designates EnRoute airspace.

Filter – DRAT tool that allows the selection of a subset of "data objects", by removing objects not containing a specified characteristic that the filter was designed to select for.
Factory – DRAT tool that combines information from existing "data objects" to create new sets of information or new data objects.

GUI – Graphical User Interface.

HDG – HFL designation for a report on the frequency of heading instructions to aircraft.
HFL – Human Factors Laboratory.

Interval – A period of time measurement; often used to specify the length of time for each subtotal in an aggregate measurement.

JPVD – Java Planned View Display

LCNF – Wake Vortex (Longitudinal) Conflict

MISSAPP – HFL designation for a report on the frequency of missed approaches in the terminal control area.

NASCNF – HFL designation for a report on "airspace conflicts", the frequency of aircraft entering restricted airspace.
NBSCNF – HFL designation for a report on the number of between sector conflicts (separation violations).
NCOMP – HFL designation for a report on the number of flights completed (landed) by the controller over a given period of time.
NDEPT – Number of Departures
NECNF – HFL designation for a report on the number of EnRoute sector conflicts (separation violations) for separation distances that are user-specified.
NHAND – HFL designation for a report on the number of flights handled by the controller over a given period of time.
NHOFF – HFL designation for a report on the number of handoffs of aircraft from one sector to another over a given period of time.
NHTDLY – HFL designation for a report on the number of aircraft put in a holding pattern (to delay traffic) over a given period of time.

NLCNF – HFL designation for a report on the number of longitudinal conflicts (separation violations of pairs of aircraft on final approach that are in-trail of one another).
NPCNF – HFL designation for a report on the number of parallel conflicts (separation violations of pairs of aircraft in terminal airspace).
NM – Nautical mile = 6080 ft or 1.85 kilometers.
NPTT – HFL designation for a report on the number of push-to-talks keyed by a controller over a given period of time.
NSECNF – HFL designation for a report on the number of standard EnRoute sector conflicts (separation violations).
NSTCNF – HFL designation for a report on the number of standard terminal airspace sector conflicts (separation violations).
NSTDLY – HFL designation for a report on the number of gate hold delays between the scheduled and actual takeoff times over a given period of time.
NTCNF – HFL designation for a report on the number of terminal airspace sector conflicts (separation violations) for separation distances that are user-specified.
NTZ – No Transgression Zone

Pass Through – An option in many of the DRAT tools that determines whether the next tool received data objects that are not specifically sent or eliminated.
For example, an Aircraft ID Filter will receive three categories of data objects:

1) Data objects that are specified by the tool's Aircraft ID list,
2) Data objects that are not included in the tool's Aircraft ID list, and
3) Data objects that do not have an associated aircraft ID.

Data objects in category 3 are sent if Pass Through is enabled (checked), and are not sent if Pass Through is disabled (not checked). In contrast, data objects in category 1 are always sent and data objects in category 2 are never sent.
PCNF – Parallel Conflict, which is when two aircraft in different sectors are in conflict.
Push To Talk (PTT) – data concerning when a pilot or controller trigged a press or release on their communication channel.

Reader – DRAT tool that allows the selection of an input file (generally encoded in TGF simulator recording format) to translate data into "data objects" that the other DRAT tools can operate on.
Recording File – is a file containing second-by-second information on the condition of a TGF simulation.

SECNF – Standard Separation Violation for EnRoute Airspace
SID – Standard Instrument Departure Route
SP – Sim Pilot
SPW – Sim Pilot Workstation
SPD – HFL designation for a report on the frequency of speed instructions to the aircraft.
STAR – Standard Terminal Arrival Route
STCNF – Standard Separation Violation for Terminal Airspace
STDLY – Takeoff Delays

TCA – Terminal Control Area
TCNF – User-defined separation violation for Terminal Airspace
TERM – Designates terminal airspace.
TGF – Target Generator Facility

UFP – Universal Flight Plan

VOIDUR – HFL designation for a report containing the cumulative time, in seconds, that the controller in transmitting to the aircraft under his/her control.
VOIFREQ – HFL designation for a report on the frequency of voice communications between controllers and the aircraft.

Wake Vortex – The unstable pocket of air that is created behind an aircraft in flight.
Writer – DRAT tool that allows the selection of an output file in a specific format. Each writer generates a report to an output file, which can be read by an editor or sent to a writer.

XCNF – X-Value Conflict

9 Distance Measurements

The following distance measurements are used in DRAT:

- **Horizontal Distance** is the distance between Aircraft A1 and Aircraft A2 taken at the same altitude. It does **not** include the vertical component. It is as if an Imaginary Point (IP) is drawn so that the Aircraft A1 and A2 are at the same altitude and the distance is taken between these two points.

- **Linear Distance** is the straight line distance between Aircraft A1 and Aircraft A2. It does include the vertical component. If the Aircraft are at the same altitude, then this distance is equal to the Horizontal Distance.

- **Vertical Distance** is the distance between altitudes' of Aircraft A1 and Aircraft A2.

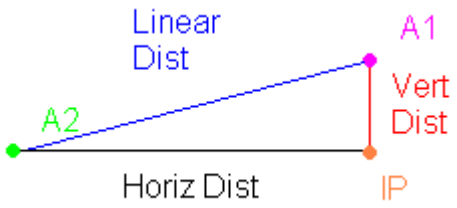


Figure 86

10 Wake Vortex Turbulence Separation

Wake Vortex Turbulence Separation calculations in DRAT are based on the following:

- Whether Aircraft is in Terminal or EnRoute Airspace.
    - For Terminal Airspace the default separation distance is 3 nm according to FAA JO 7110.65T Section 5 Radars Part 5-5-4 Minima.
    - For EnRoute Airspace the default separation distance is 5 nm or greater according to FAA JO 7110.65T Section 5 Radars Part 5-5-4 Minima.
- The Aircraft's Weight Class as defined in FAA JO 7110.65T CHG 1 Appendix A. Aircraft Information Fixed Wing Aircraft:
    - Heavy – "capable takeoff weights of 300,000 pounds or more"
    - Large – "more than 41,000 pounds, maximum certificated takeoff weight, and up to but not including 300,000 pounds."
    - Small – "41,000 pounds or less maximum certificated takeoff weight."
- The following Aircraft Types currently have special wake vortex rules:
    - A380 series as defined in FAA JO 7119.541. See A380 Series Section for more information.
    - B748 as defined in FAA JO 7110.543. See B748 Section for more information.
    - B757 as defined in FAA JO 7110.65T. See Heavy, B757, Large, or Small Section for more information.
- Whether the lead aircraft has crossed its arrival runway's threshold.
- Whether the lead aircraft is on ILS approach.

The minimum altitude separation is 1,000 feet According to FAA JO 7110.65T. **Note:** Wake Vortex Turbulence Separation calculations do not include Airships since they do not create a wake.

10.1 A380 Series

J0 7110.541 Subj: Interim Procedures for Airbus A388 Flights

Section 5. Procedures Subparagraph b. Terminal

Separate aircraft operating directly behind, or directly behind and less than 1,000 feet below, or following an aircraft conducting an instrument approach by:
NOTE – Consider parallel runways less than 2,500 feet apart as a single runway because of the possible effects of wake turbulence.

- Heavy behind A388 – 6 nm
- Large behind A388 – 8 nm
- Small behind A388 – 10 nm

Section 5. Procedures Subparagraph a. EN ROUTE

- Heavy, Large, or Small behind A388 – 5 nm

10.2 B748

J0 7110.543 Subj: Interim Procedures for Boeing 747-8 (B748) Flights

Section 5. Procedures Subparagraph a. Terminal

Separate aircraft operating directly behind, or directly behind and less than 1,000 feet below, or following an aircraft conducting an instrument approach by:
NOTE – Consider parallel runways less than 2,500 feet apart as a single runway because of the possible effects of wake turbulence.

- Heavy, Large, or Small behind B748 – 10 nm

Section 5. Procedures Subparagraph b. EN ROUTE

- Heavy, Large, or Small behind B748 – 5 nm

10.3 Heavy, B757, Large, or Small

JO 7119.65T

Section 5-5-3. Minima Subparagraph f. Terminal

In addition to subpara e., separate an aircraft landing behind another aircraft on the same runway, or one making a touch-and-go, stop-and-go, or low approach by ensuring the following minima will exist at the time the preceding aircraft is over the landing threshold:
NOTE – Consider parallel runways less than 2,500 feet apart as a single runway because of the possible effects of wake turbulence.

- Small behind Large – 4 nm
- Small behind B757 – 5 nm
- Small behind Heavy – 6 nm

Section 5-5-3. Minima Subparagraph e.

Separate aircraft operating directly behind, or directly behind and less than 1,000 feet below, or following an aircraft conducting an instrument approach by:
NOTE – Consider parallel runways less than 2,500 feet apart as a single runway because of the possible effects of wake turbulence.

- Heavy behind Heavy – 4 nm
- Large/Heavy behind B757 – 4 nm.
- Small behind B757 – 5 nm
- Small/Large behind Heavy – 5 nm

11 Push To Talk (PTT)

This Appendix contains information on how to configure DRAT to process PTT data.

11.1 Required Files

The following files are required:

- A TGF Recording file
- A PTT log file from the CCS

11.2 Drat Configuration

Below is a picture of an example to of how to configure DRAT when doing PTT processing. The PTT Reader should appear underneath the DRA Reader before any filters or factories in the configuration. The PTT Duration Factory is optional but it produces useful statistical information. TGF has recently added the ability to filter PTT data based on information sent to TGF by the CCCS at the time of the simulation. This is useful if the PTT Log file contains information from more than one current simulation.

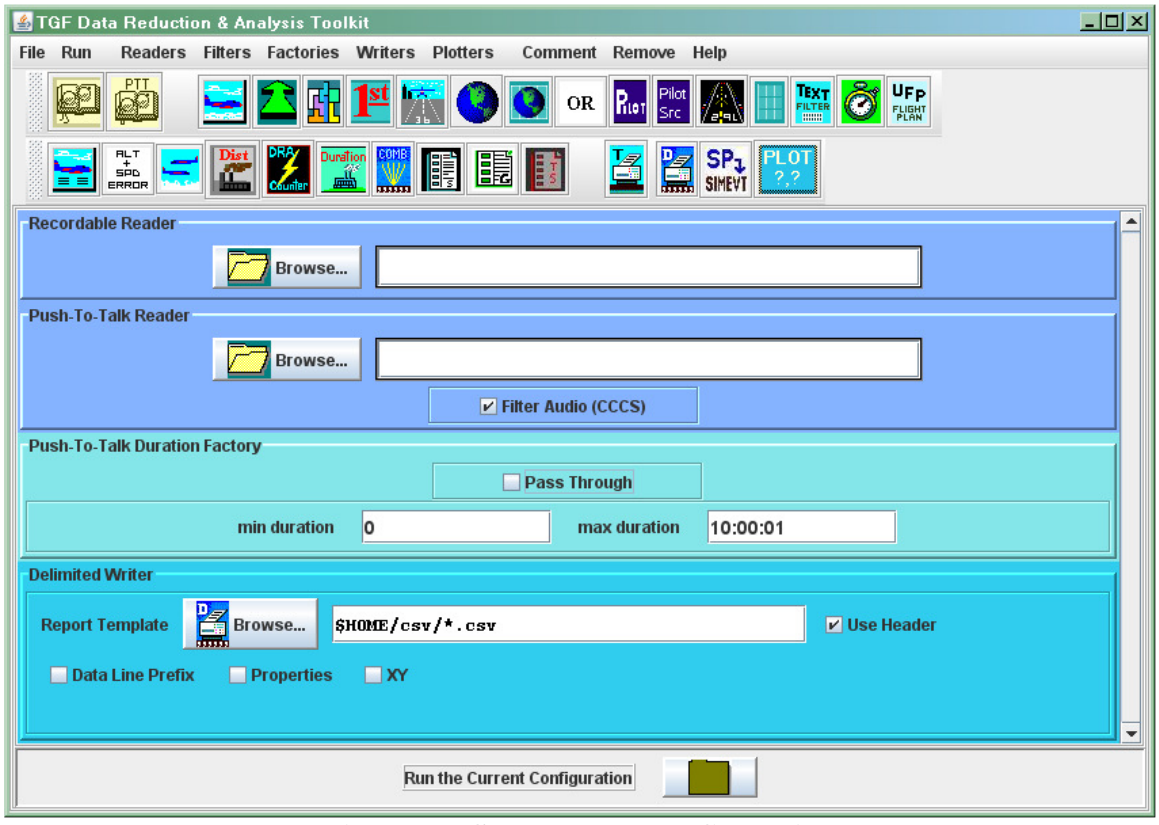


Figure 87 Sample Drat configuration

11.3 Input

Below is a picture of a sample PTT Log file from the CCCS.

```
Wed Jan 27 06:04:05 EST 2010 PTT: ON IcssController01 0 0 "Wed Jan 27 06:04:05.810"
Wed Jan 27 06:04:05 EST 2010 PTT: OFF IcssController01 0 0 "Wed Jan 27 06:04:05.872"
Wed Jan 27 08:31:39 EST 2010 PTT: ON TgfPilot16 17 6 "Wed Jan 27 08:31:38.803"
Wed Jan 27 08:31:39 EST 2010 PTT: OFF TgfPilot16 17 6 "Wed Jan 27 08:31:38.888"
```

Figure 88 Sample PTT Log File

Each line in the PTT Log contains data about a single PTT event, with data about the PTT event separated by spaces unless it appears in quotes. The table below contains the information about the data found in a PTT Event. The sample values provided are from the PTT Event: Wed Jan 27 08:49:53 EST 2010 PTT: ON TgfPilot04 18 4 "Wed Jan 27 08:49:52.617".

Field Location	Sample Value	Explanation
1	Wed	Day of week logged
2	Jan	Month logged
3	27	Day in month logged
4	08:49:53	Time of day in 24 hour clock logged
5	EST	Time Zone logged
6	2010	Year logged
7	PTT:	PTT Marker
8	ON	Whether PTT was ON/OFF
9	TgfPilot04	Source either TGF, a Cockpit, or a Controller
10	18	CCCS Channel where zero indicates an unassigned source
11	4	Index on the channel, where zero usually indicates the controller channel for CCCS Channel
12	"Wed Jan 27 08:49:52.617"	Day and Time actual PTT actually occurred

11.4 Output

TGF currently produces two delaminated output files that feature PTT data:

- PttRecordable
- PttStatitics

11.4.1 PttRecordable

The PttReader produces PttRecordable. One PttRecordable is produced for each PTT event in the PTT log file. PttRecordable contains the following information:

- Origin – Where the PTT was from either a Controller/Sim Pilot/Cockpit channel name followed by number
- IsOn – Whether PTT was on/off
- SimTime – Time in simulation event occurred in HH:MM:SS
- SystemTime – System time event occurred (wall clock) in DATE HH:MM:SS
- ChannelAssignment – Simulation channel assignment. A value of 0 indicates an invalid channel assignment.
- ChannelIndex – Simulation Channel index which is the position within the channel assignment. A value of 0 combined with a channel assignment value of any value other than 0 indicates the Origin that was considered the controller for a channel. A value of 0 combined with a channel assignment value of 0 indicates an invalid Origin.
- ZuluTime – SystemTime in Zulu time in Year-Month-Day"T"HH:MM:SS.SSS GMT" for example 2011-02-11T23:20:10.001 GMT
- VhfFreq – The VHF Frequency of the origin. Only filled in if DRAT is able to determine it.
- SectorName – The name of the Sector of the origin. Only filled in if DRAT is able to determine it.

11.4.2 PttStatistic

The PttDurationFactory produces PttStatistic. One PttStatistic is produced for each origin found in the PTT log file. PttStatistic contains the following information:

- Type – The PTT Origin the data is about.
- Total – The Total combined time an origin was talking or on.
- Frequency – The number of communications an origin made.
- Average – The average length of a communication an origin made.
- VhfFreq – The VHF Frequency of the origin. Only filled in if DRAT is able to determine it.
- Sector – The name of the Sector of the origin. Only filled in if DRAT is able to determine it.

12 Externally Provided ("Alien") Aircraft

TGF can receive Aircraft data from external sources (such as cockpit simulators) from Aviation SimNet (ASN). For more information on ASN please see www.aviationsimnet.net. The Aircraft based on this data are referred to Alien Aircraft and have a Flying Status of ALIEN_CTRL. Some tools in DRAT may not work with Alien Aircraft, since the Alien Aircraft data is not as complete as TGF Aircraft data (completeness of the Alien Aircraft data may vary depending on the source). In addition, some recorded Alien data may contain extrapolated data so some tools in DRAT may require the user specify to include Alien data. Below is a table which contains whether DRAT's Tools can be used with any Aircraft data including Alien Aircraft or just TGF generated Aircraft data.

Readers	
Name	**Works With**
Recordable Reader (For detailed description: see 5.1.1)	Any Aircraft Data
PTT Reader (For detailed description: see 5.1.2)	Does not require Aircraft Data

Filters	
Name	**Works With**
Aircraft Filter (For detailed description: see 5.2.1)	Any Aircraft Data
Altitude Filter (For detailed description: see 5.2.2)	Any Aircraft Data
CCCS Audio Filter (For detailed description: see 5.2.3)	Does not require Aircraft Data
Class Type Filter (For detailed description: see 5.2.4)	Depends on the Class Type Selected.
First Occurrence of Name Filter (For detailed description: see 5.2.5)	Any Aircraft Data
Flying Status Filter (For detailed description: see 5.2.6)	Any Aircraft Data
Geographic Area Filter (For detailed description: see 5.2.7)	Any Aircraft Data
Geographical Sector Filter (For detailed description: see 5.2.8)	Any Aircraft Data
HFL Handoff to Boundary Filter (For detailed description: see 5.2.9)	Any Aircraft Data
OR Filter (For detailed description: see 5.2.10)	Any Aircraft Data
Pilot Command Filter (For detailed description: see 5.2.11)	Does not require Aircraft Data
Pilot Command Source (For detailed description: see 5.2.12)	Does not require Aircraft Data
Runway Filter (For detailed description: see 5.2.13)	TGF Aircraft Data
Sector Filter (For detailed description: see 5.2.14) Sector	Any Aircraft Data
Set Aircraft Sector Values (For detailed description: see 5.2.15)	Any Aircraft Data
Text Filter (For detailed description: see 5.2.16)	Any Aircraft Data

Filters	
Name	**Works With**
Time Filter (For detailed description: see 5.2.17)	Any Aircraft Data
Time Sampler (For detailed description: see 5.2.18)	Any Aircraft Data
Universal Flight Plan Filter(For detailed description: see 5.2.19)	TGF Aircraft Data

Factories	
Name	**Works With**
Aircraft Field Duration Factory (For detailed description: see 5.3.1)	Any Aircraft Data
Altitude and Speed Error Factory (For detailed description: see 5.3.2)	TGF Aircraft Data
Approach Pullout Factory (For detailed description: see 5.3.3)	TGF Aircraft Data only
Data Object Count Factory (For detailed description: see 5.3.4)	Depends on the Data Object Selected
Distance Factory (For detailed description: see 5.3.5)	Depends on type of Distance looking at. • Violation Separation – Any Aircraft Data (**Note:** The user must select to include Alien Aircraft Data) (For detailed description: see 5.3.5.1) • Wake Vortex – Any Aircraft Data (**Note:** The user must select to include Alien Aircraft Data) (For detailed description: see 5.3.5.2) • Closest Ac – Any Aircraft Data (For detailed description: see 5.3.5.3) • Site Distance – Any Aircraft Data (For detailed description: see 5.3.5.4)
Distance Summary Factory (For detailed description: see 5.3.6)	See Distance Factory
Distance Flown Between Fixes Factory (For detailed description: see 5.3.7)	Any Aircraft Data
Duration Factory (For detailed description: see 5.3.8)	Depends on the Field Selected
Event File Combiner Factory (For detailed description: see 5.3.9)	Any Aircraft Data

Factories	
Name	**Works With**
Fix Metering Factory (For detailed description: see 5.3.10)	Any Aircraft Data
Fuel Burn Factory (For detailed description: see 5.3.11)	Any Aircraft Data
Geo Sector Counter Factory (For detailed description: see 5.3.12)	Any Aircraft Data
Ground Factory (For detailed description: see 5.3.13)	TGF Aircraft Data
Ground Speed Factory (For detailed description: see 5.3.14)	Any Aircraft Data
HFL EnRoute Summary Factory (For detailed description: see 5.3.15)	Any Aircraft Data (**Note:** The user must select to include Alien Aircraft Data in Separation Calculations.)
HFL Ground Factory (For detailed description: see 5.3.16)	TGF Aircraft Data
Near Fix Count Factory (For detailed description: see 5.3.17)	Any Aircraft Data (**Note:** Alien Aircraft may be only counted based on how close they come to a given fix.)
PTT Duration Factory (For detailed description: see 5.3.18)	Does not require Aircraft Data
Route Deviation Factory (For detailed description: see 5.3.19)	Any Aircraft Data
Run Data Factory (For detailed description: see 5.3.20)	Does not require Aircraft Data
Runway Metering Factory (For detailed description: see 5.3.21)	TGF Aircraft Data
Sp Cmd Count Factory (For detailed description: see 5.3.22)	Does not require Aircraft Data
Sp Cmd Location Factory (For detailed description: see 5.3.23).	Any Aircraft Data (**Note:** DRAT may be unable to determine the closest Fix on the Alien Aircraft's Route.)
Sp Train Factory (For detailed description: see 5.3.24)	TGF Aircraft Data only

Factories	
Name	**Works With**
SPW Statistics Factory (For detailed description: see 5.3.25)	Any Aircraft Data
Terminal Simulation Factory (For detailed description: see 5.3.26)	Any Aircraft Data (**Note:** The user must select to include Alien Aircraft Data in both Separation and Wake Vortex Calculations.

Writers	
Name	**Works With**
Text Writer (For detailed description: see 5.4.1)	Any Aircraft Data
Delimited Writer (For detailed description: see 5.4.2)	Any Aircraft Data
Flight Plan Writer (For detailed description: see 5.4.3)	TGF Aircraft Data
Sim Event Writer (For detailed description: see 5.4.4)	Does not require Aircraft Data
Plot Generator XML Writer (For detailed description: see 5.4.5)	Any Aircraft Data
Sectorizing Writer (For detailed description: see 5.4.6)	Any Aircraft Data
Sp Assign File Writer – (For detailed description: see 5.4.7)	Does not require Aircraft Data
Aircraft 4D Position Writer (For detailed description: see 5.4.8)	Any Aircraft Data
KML Writer (For detailed description: see 5.4.9)	Any Aircraft Data
XY Plotter (For detailed description: see 5.5.1)	Any Aircraft Data

13 Command Line Options

DRAT has several optional command line arguments. Which arguments you can use depends on whether you wish to run DRAT in batch or GUI mode.

The following command line arguments will work with batch or GUI mode:

- -help (This option prints out a short help message about command line options and exits DRAT.)
- -tolerant (This option will cause DRAT to ignore certain exceptions (OptionalDataException, InvalidObjectException, ClassNotFoundException, InvalidClassException, and ClassCastException) when reading a recording.)

Note: Running with the --tolerant command option is NOT recommended.

The following command line arguments only work for batch processing. Batch processing in DRAT means that no GUI will appear:

- -nogui (This option is used to indicate that DRAT should run in batch mode. In addition, this option is followed by a list of DRAT configuration file names, each separated by a space, to run each recording on. **Note: It is recommend that you create configuration files in GUI mode.)**
- -rec (This option is followed by a list of TGF recording file names each separated by a space.)
    - **Note:** Adding the -rec option with one or more TGF recording files causes the following:
        - The TGF recording file(s) listed replace the input file(s) of the DRAT configurations.
        - Output filenames/directories produced will be the same as the recording filenames, but with an extension matching the prefix of the configuration file.
- -ptt (This option is followed by a list of PTT recording file names each separated by a space.)
- -keepAsterisk (This option will keep any * if found before the end of an output file name: useful for delimited output with asterisks specified for the file name.)

Input file names to Readers will be replaced with file names specified by -rec; and the output filenames will incorporate the input file name and the configuration file name.

13.1 Examples

Below are some examples on how to run DRAT using command line options.

13.1.1 Example 1.

The command line to run DRAT in Batch Mode with multiple DRAT configuration files:

```
java -Xmx1000M -cp <tgf jar file> faa.tg.dra.gui.Drat --nogui <DRAT configuration list>
```

Where <tgf jar file > is replaced with a TGF jar file for example /tgf/lib/tgf.jar and <DRAT configuration list> is replaced by a list of DRAT configuration files separated by a space for example all.drat and x2.drat. In this case the command line would look like:

```
java -Xmx1000M -cp /tgf/lib/tgf.jar faa.tg.dra.gui.Drat -nogui all.drat x2.drat
```

13.1.2 Example 2.

The command line to run DRAT in Batch Mode with multiple DRAT configuration files and recording files:

```
java -Xmx1000M -cp <tgf jar file> faa.tg.dra.gui.Drat --nogui <DRAT configuration list> – rec <Recording file list>
```

Where <tgf jar file > is replaced with a TGF jar file for example /tgf/lib/tgf.jar and <DRAT configuration list> is replaced by a list of DRAT configuration files separated by a space for example all.drat and x2.drat. The variable <recording file list> is replaced with a list of Recording files separated by a space for example file1.rec file2.rec. In this case the command line would look like:

```
java -Xmx1000M -cp /tgf/lib/tgf.jar faa.tg.dra.gui.Drat -nogui all.drat x2.drat -rec file1.rec file2.rec
```

Input file names to Readers will be replaced with file names specified by -rec; and the output filenames will incorporate the input file name and the configuration file name.

13.1.3 Example 3.

The command line to run DRAT in Batch Mode with multiple DRAT configuration files, recording files, and PTT files:

java -Xmx1000M -cp <tgf jar file> faa.tg.dra.gui.Drat --nogui <DRAT configuration list> – rec <Recording file list> -ptt <PTT file list>

Where <tgf jar file > is replaced with a TGF jar file for example /tgf/lib/tgf.jar and <DRAT configuration list> is replaced by a list of DRAT configuration files separated by a space for example all.drat and x2.drat. The variable <recording file list> is replaced with a list of Recording files separated by a space for example file1.rec file2.rec and <PTT file list> is replaced by a list of PTT files separated by a space for example ptt1.log and ptt2.log. In this case the command line would look like:

java -Xmx1000M -cp /tgf/lib/tgf.jar faa.tg.dra.gui.Drat -nogui all.drat x2.drat -rec file1.rec file2.rec -ptt ptt1.log ptt2.log

Input file names to Readers will be replaced with file names specified by -rec; and the output filenames will incorporate the input file name and the configuration file name.

Note: It is assumed that the corresponding DRA input file is in the -rec list in the same place. For example -rec file1.rec file2.rec -ptt ptt1.log ptt2.log means that ptt1.log should be run with file1.rec and file2.rec should be run with ptt2.log.

14 Applications to facilitate usage of DRAT

This section contains information on applications designed to facilitate the use of DRAT.

14.1 DRAT Batch Wizard

The DRAT Batch Wizard is an application designed to configure and run a batch of DRAT jobs using existing DRAT Configuration File(s). This Application has eleven steps. If the user needs to run the batch job again a File containing the DRAT Batch Mode Command Line is created. The user will be notified if there are any problems that occur while running the application via a pop-up window. Any messages from the application will appear in the "DRAT Batch Wizard Message Log" Window. To terminate the Application press the X button on the upper right hand corner of this window.

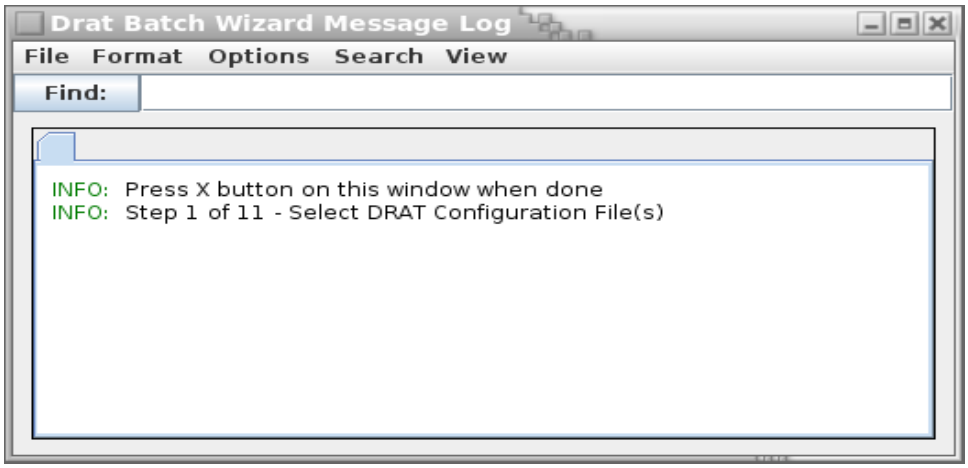


Figure 89

The command line to run the DRAT Batch Wizard is:

java -Xmx1000M -cp <tgf jar file> faa.tg.dra.gui.DratBatchWizard

For example

java -Xmx1000M -cp tgf.jar faa.tg.dra.gui.DratBatchWizard

14.1.1 Step 1: Select DRAT Configuration File(s)

In this Step the user selects a DRAT Configuration File or a Directory of Configuration Files to run. DRAT Configuration files typically end in a .drat file extension.

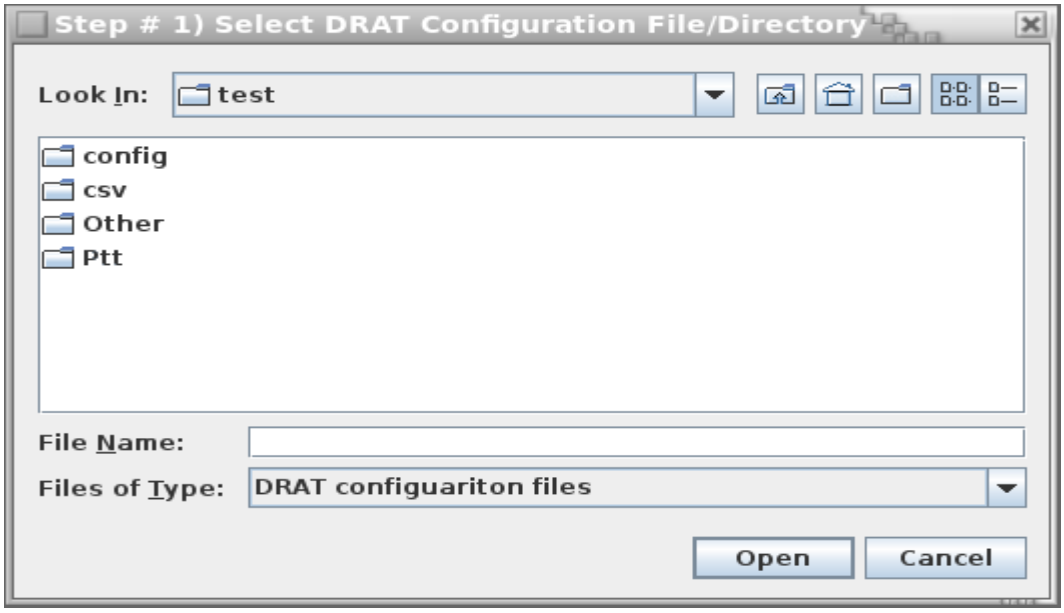


Figure 90

14.1.2 Step 2: Keep File Template?

In this Step the user indicates whether to keep any asterisk "*" found in output file names. If the Template for a Delim Writer File name does not contain an asterisk ("*"), then a directory with the given name and location are created. For more information on the Delimited Writer see 5.4.2.

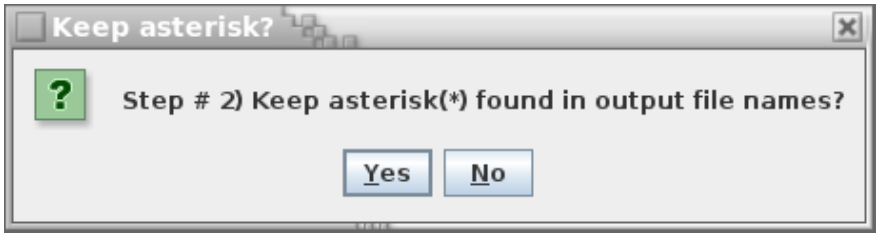


Figure 91

14.1.3 Step 3: Change TGF Recording File?

In this Step the user indicates if they want to change the TGF Recording File that a configuration will run on.

Figure 92

14.1.4 Optional Step 4: Select Recording File(s)

This Step only occurs if the user indicates that they want to change the TGF Recording File that a configuration will run. The user selects a TGF Recording File or a Directory of TGF Recording Files to have a Configuration run on.

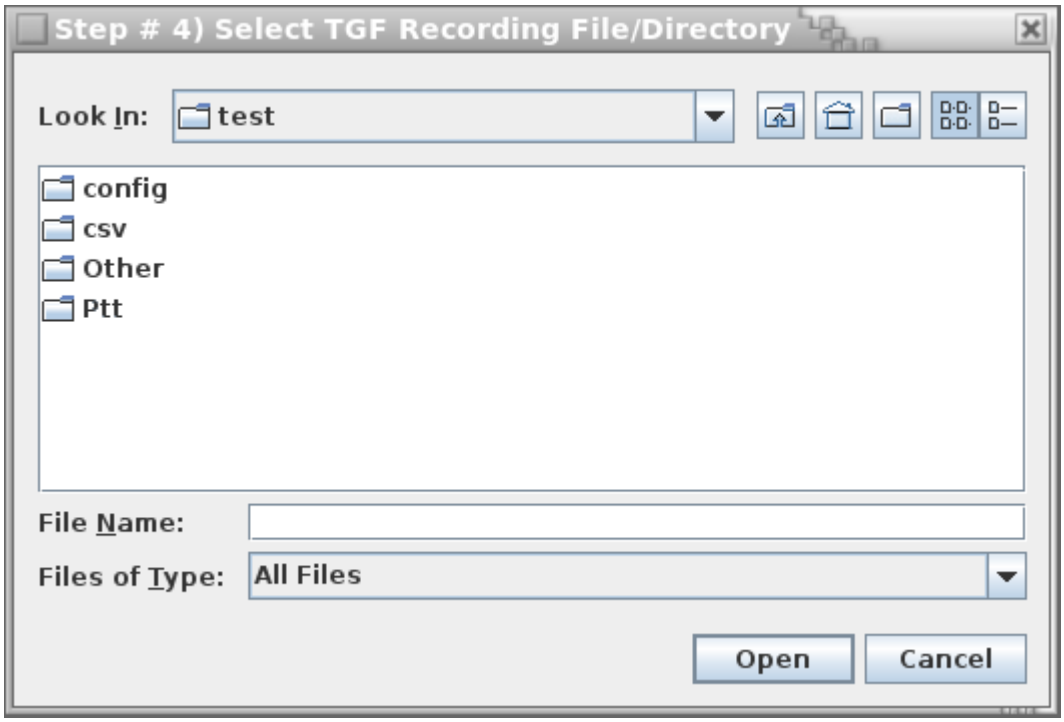


Figure 93

14.1.5 Step 5: Push To Talk (PTT)?

In this Step the user indicates whether the Configuration File(s) loaded involve a PTT Log file that they wish to change.

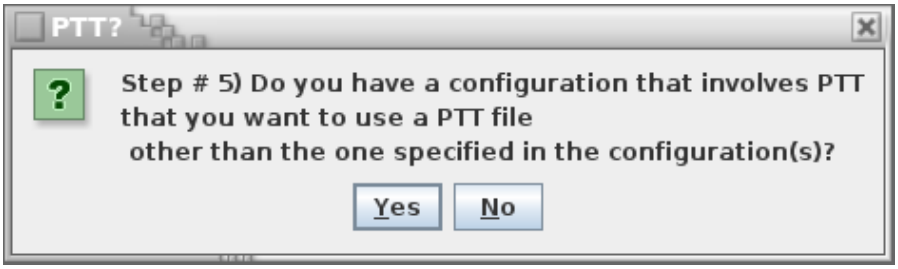


Figure 94

14.1.6 Optional Step 6: Select PTT File(s)

This Step only occurs if the user indicates that they want to change the PTT Log File that a configuration will run. The user selects a PTT Log File or a Directory of PTT Logs Files to run.

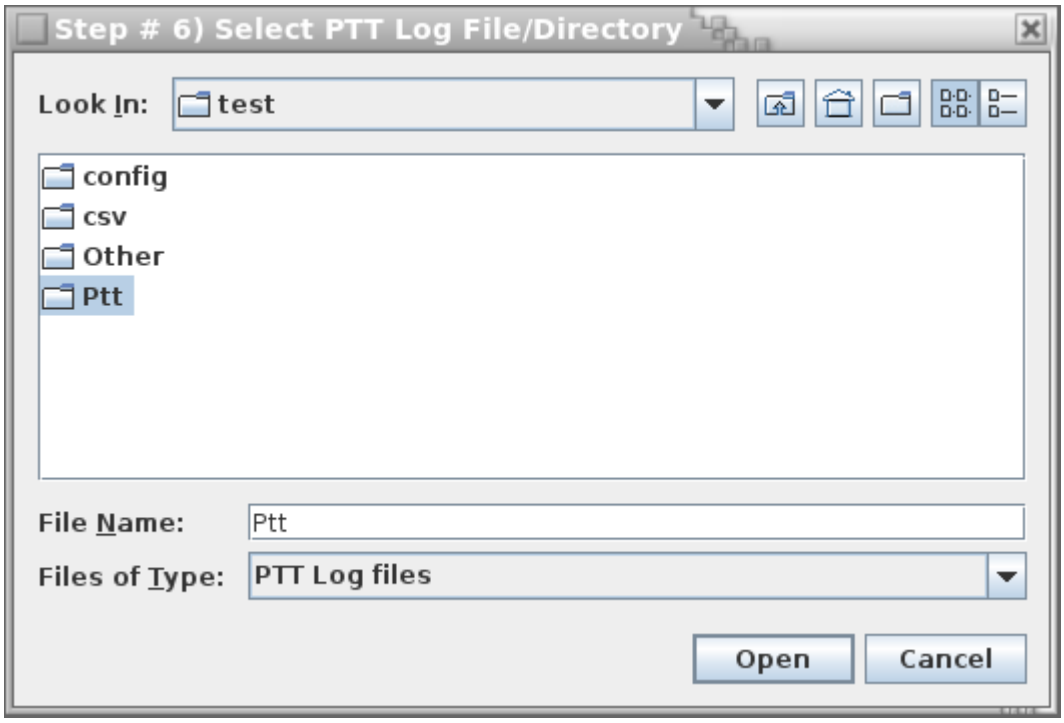


Figure 95

14.1.7 Optional Step 7: Specify Association Files

This Step only occurs if the user indicates that they want to change the PTT Log File that a configuration will run. The user selects which TGF Recording File to run with which PTT Log File.

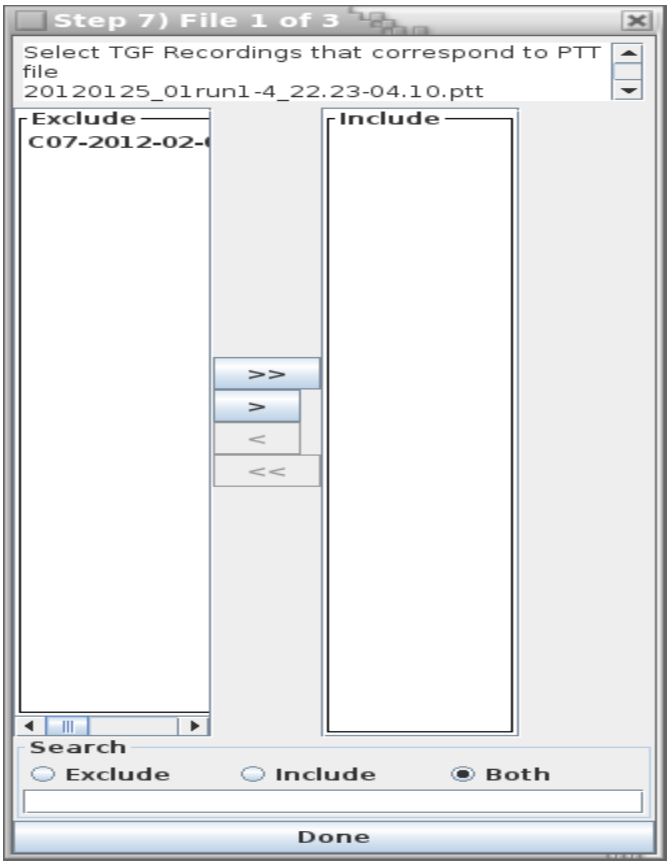


Figure 96

14.1.8 Step 8: Save Command Line

In this Step the user can indicate if they would like to save the DRAT Command Line that the Batch Wizard ran to another File other than the Default File. This File can be used to run batch job again.

Figure 97

14.1.9 Optional Step 9: Where to Save Command Line?

This Step only occurs if the user indicates that they want to change the where the DRAT Batch Command Line is saved. The user chooses where to save the information.

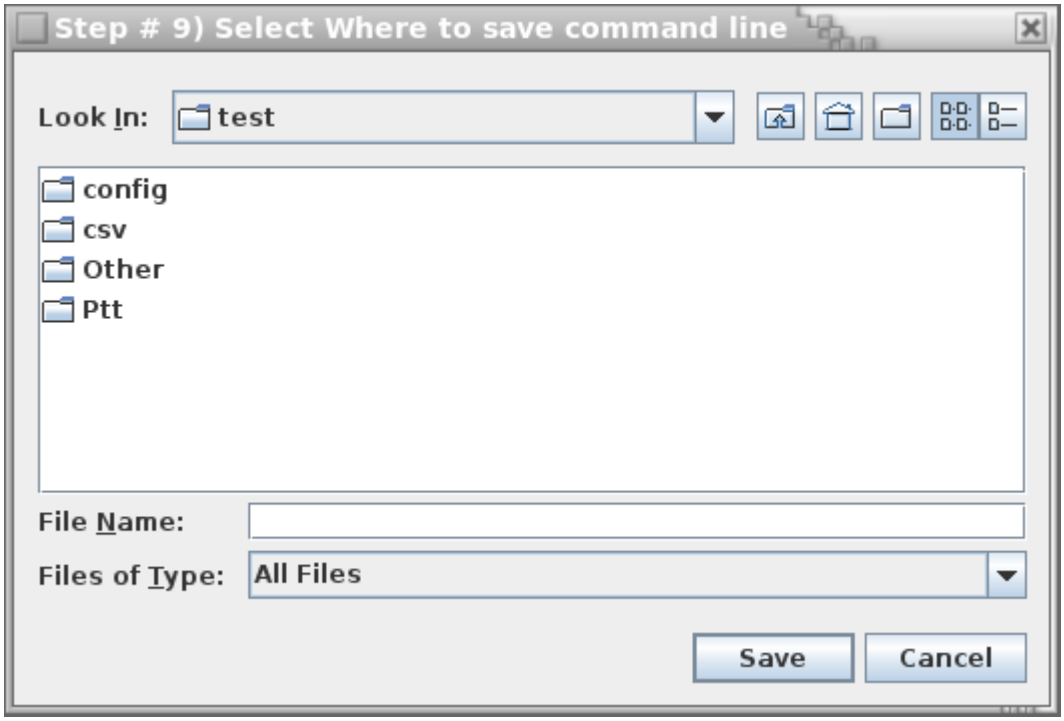


Figure 98

14.1.10 Step 10: Run Batch

In this Step DRAT is run.

14.1.11 Step 11: Finishing up

When DRAT is done a Pop-up Window will appear at this point the user can choose to review messages from the run. To exit the DRAT Batch Wizard by pressing the X button on the upper right hand corner of the "DRAT Batch Wizard Message Log" Window.

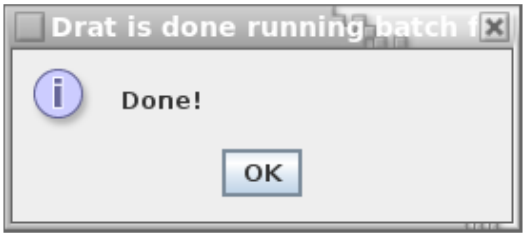


Figure 99

14.2 DRAT Box Builder

The DRAT Box Builder application will make a Box around an Airport or Fix. The Application makes a configuration file that the user can load into DRAT via the "File" Menu's "Open" option. The configuration contains a Geographical Area Filter (see Section 5.2.7 for more information). In addition, the Application creates a ".jmap" file that can be loaded into JPVD. See the "TGF Java Plan View Display" Manual at www.faa.gov/go/tgf for more information on JPVD. The command line to run the DRAT Box Builder is:

java -Xmx1000M -cp <tgf jar file> faa.tg.dra.gui.DratBoxBuilder

For example

java -Xmx1000M -cp tgf.jar faa.tg.dra.gui.DratBoxBuilder

The Builder has 11 Steps. The user will be notified if there are any problems that occur while running the application via a pop-up window. Any messages from the application will appear in the "DRAT Box Builder Message Log" window.

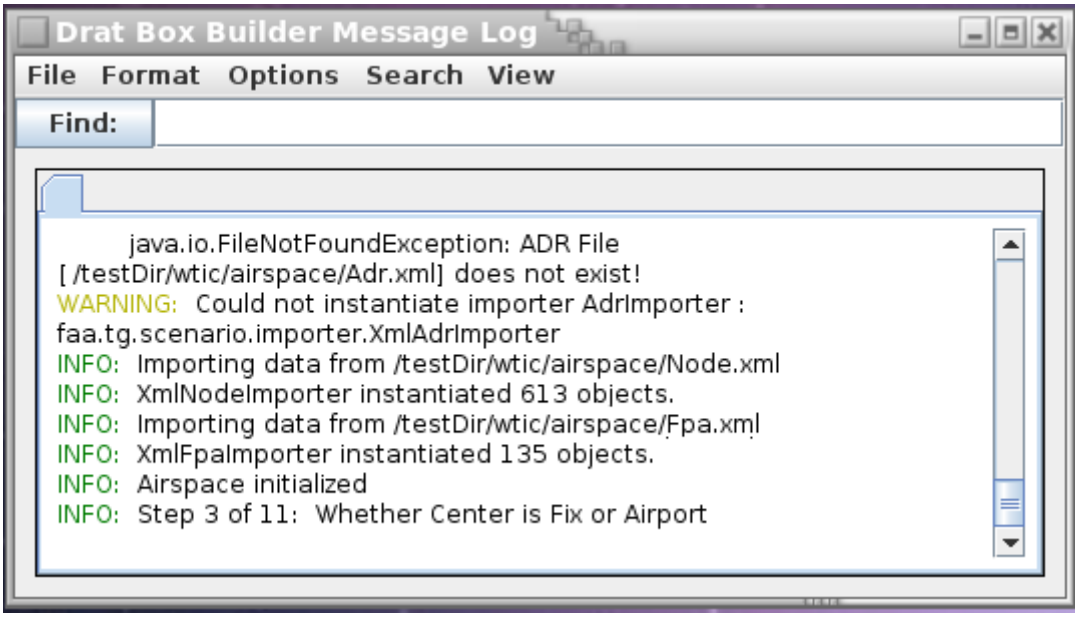


Figure 100

14.2.1 Step 1: Select Properties File

In this Step the user selects the TGF Properties file to load. This file contains information about Airspace data. Typically this file is located in the properties directory of the scenario that the user wishes to load the airspace for example /tgf/data/GENRA/properties.

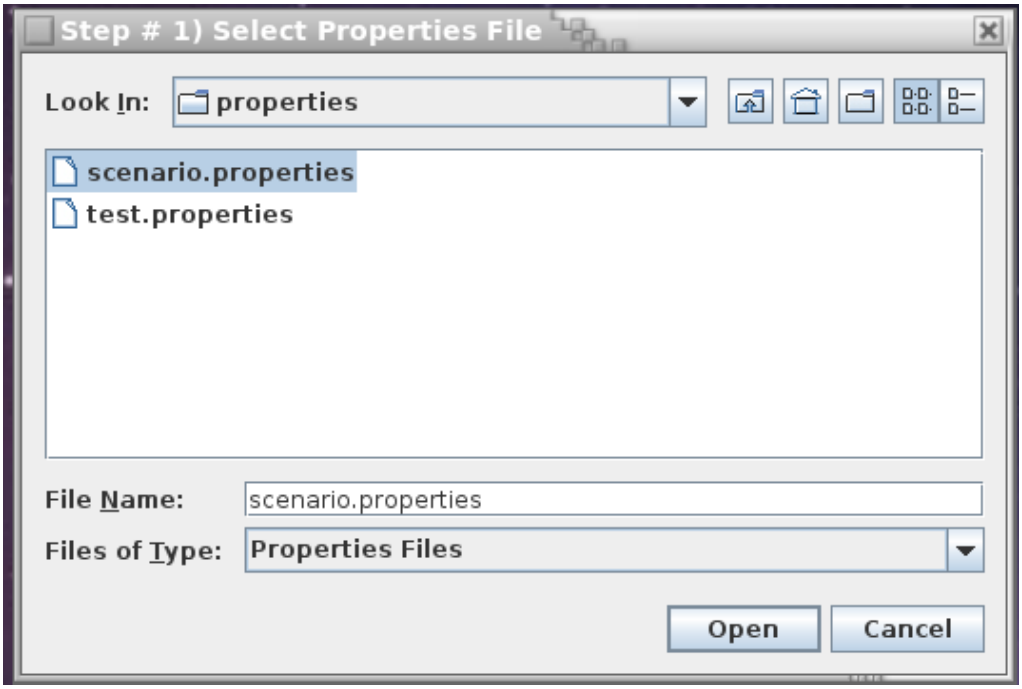


Figure 101

14.2.2 Step 2: Load the Airspace Data

In this Step the Airspace specified by the user is loaded into the Application.

14.2.3 Step 3: Select Type of Center

In this Step the user chooses whether the Center of the Box will be a Fix or Airport.

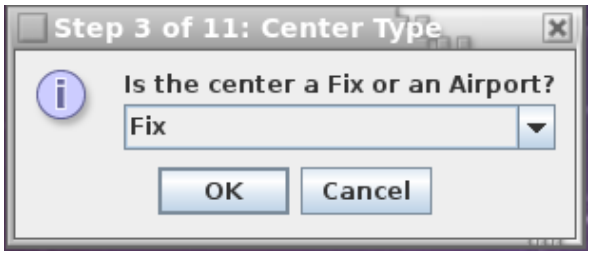


Figure 102

14.2.4 Step 4: Select the Center of the Box

In this Step the user chooses the name of the Center from a list of valid Fixes/Airports.

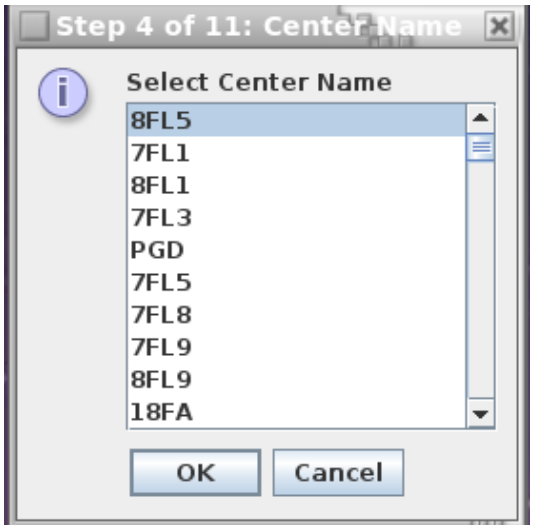


Figure 103

14.2.5 Step 5: Specify the Dimensions of the Box

In this Step the user specifies the dimensions of the Box to make around the Center Fix/Airport.

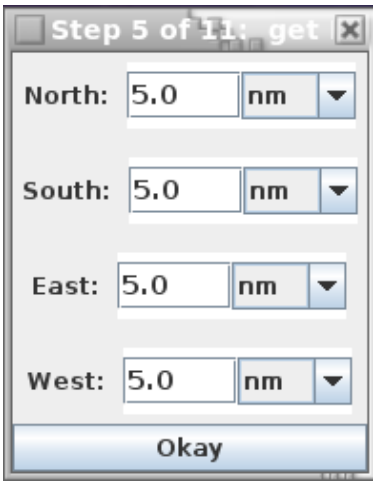


Figure 104

14.2.6 Step 6: Specify JPVD Map

In this Step the user specifies the name and path of the .jmap a JPVD map to save the Box data to. This is so that the user can view the area covered by the Geographical Filter. For more information using JPVD see the "TGF Java Plan View Display" Manual at www.faa.gov/go/tgf.

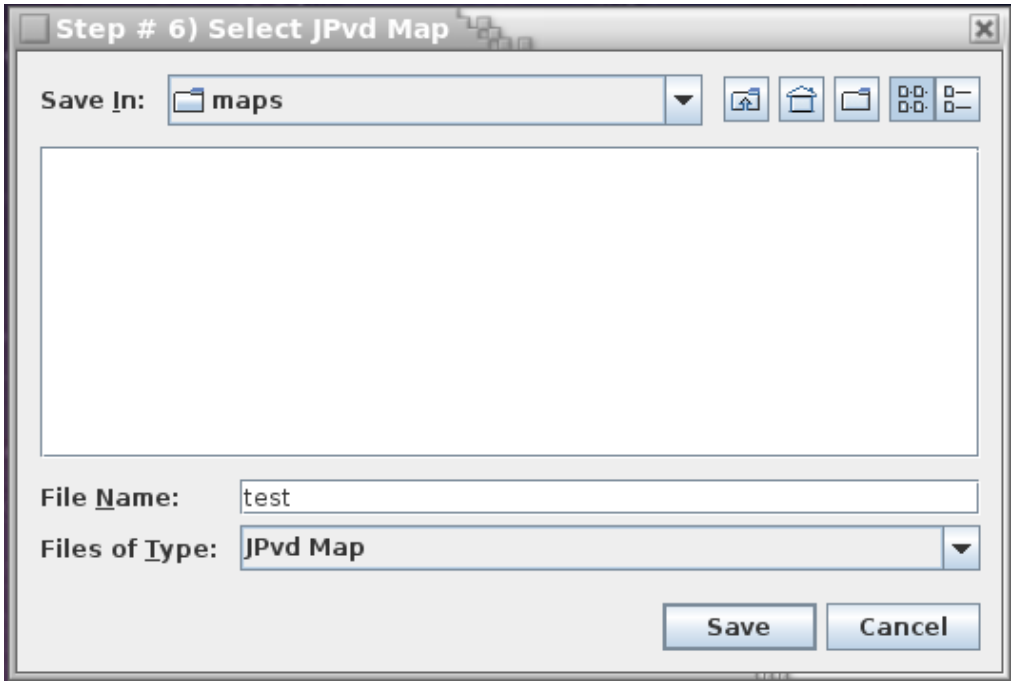


Figure 105

14.2.7 Step 7: Specify Box Color

In this Step the user specifies the colors of the Box when displayed in JPVD.

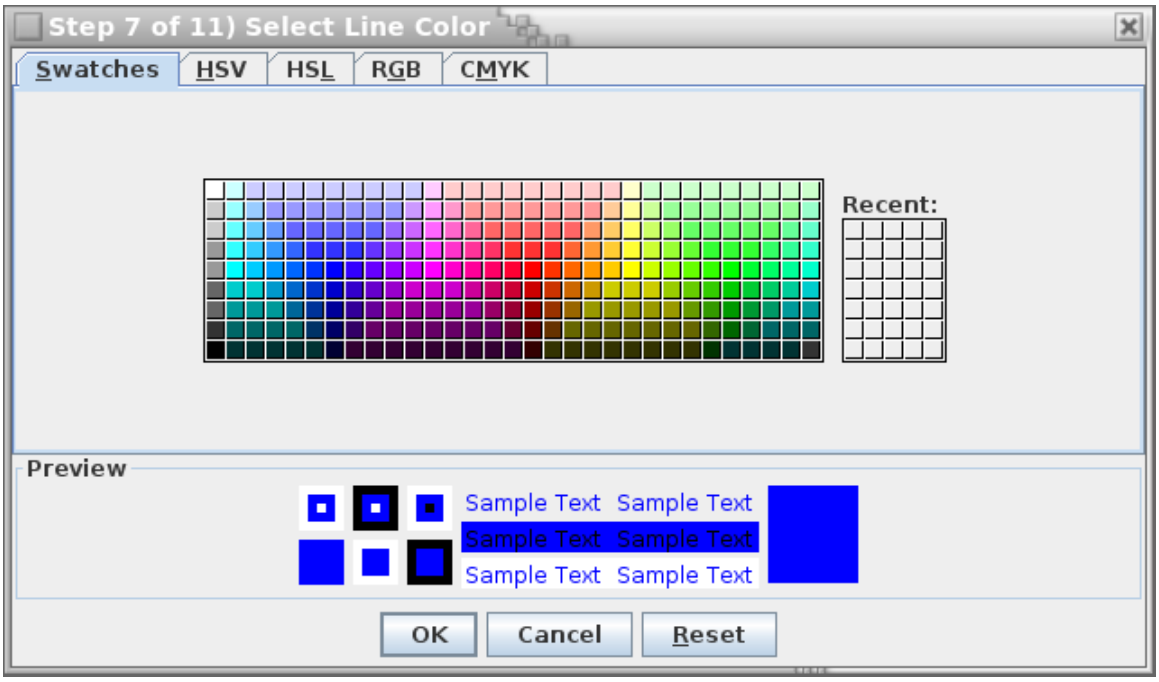


Figure 106

14.2.8 Step 8: Generate JPVD Map

In this Step the JPVD Map File is generated.

14.2.9 Step 9: Select DRAT Configuration File

In this Step the user specifies the name and path of the DRAT configuration file to save the Box to. This configuration file can be loaded into DRAT via the "File" Menu's "Open" Option.

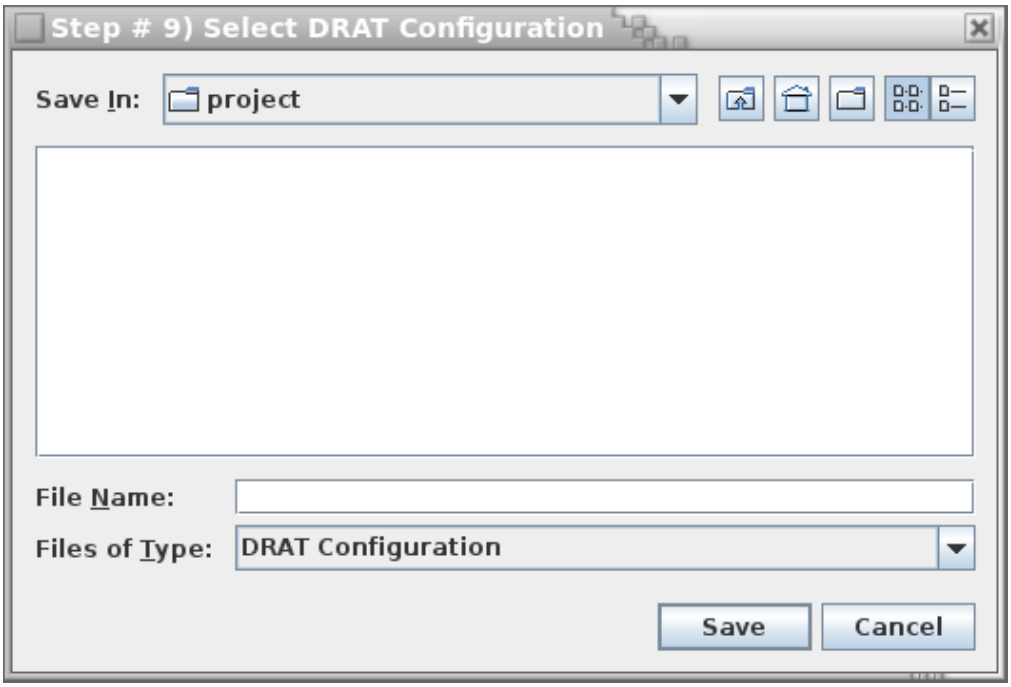


Figure 107

14.2.10 Step 10: Select whether to Exclude Area in Box

In this Step the user specifies whether the Geographical Area Filter created should exclude the area inside of the Box. See Section 5.2.7 for more information on the Geographical Area Filter.

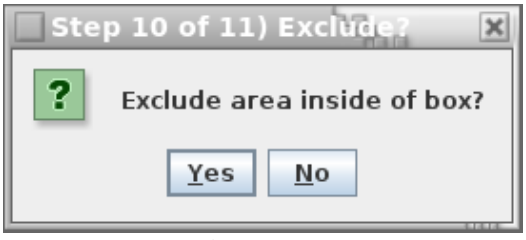


Figure 108

14.2.11 Step 11: Generate DRAT Configuration File

In this Step the DRAT Configuration File is generated and the Application will terminate.

15 Playing Back a Recording

Both the TGF Simulator Exercise Control Operator (ECO) and the Java Planned View Display (JPVD) are capable of displaying radar tracks of aircraft that are derived from a file in the TGF recording format. For more information on using the ECO to playback a recording please see the "TGF User's Manuals (ECO)" at http://www.faa.gov/go/tgf/. For more information on using JPVD to playback a recording see the "TGF Java Plan View Display" manual at http://www.faa.gov/go/tgf/.

Note: Since the aircraft are not "flying" according to TGF simulator flight dynamics, these aircraft will have a flying status of "Dead Reckoned", the designation for aircraft displayed by TGF that were generated by a non-cockpit simulator.